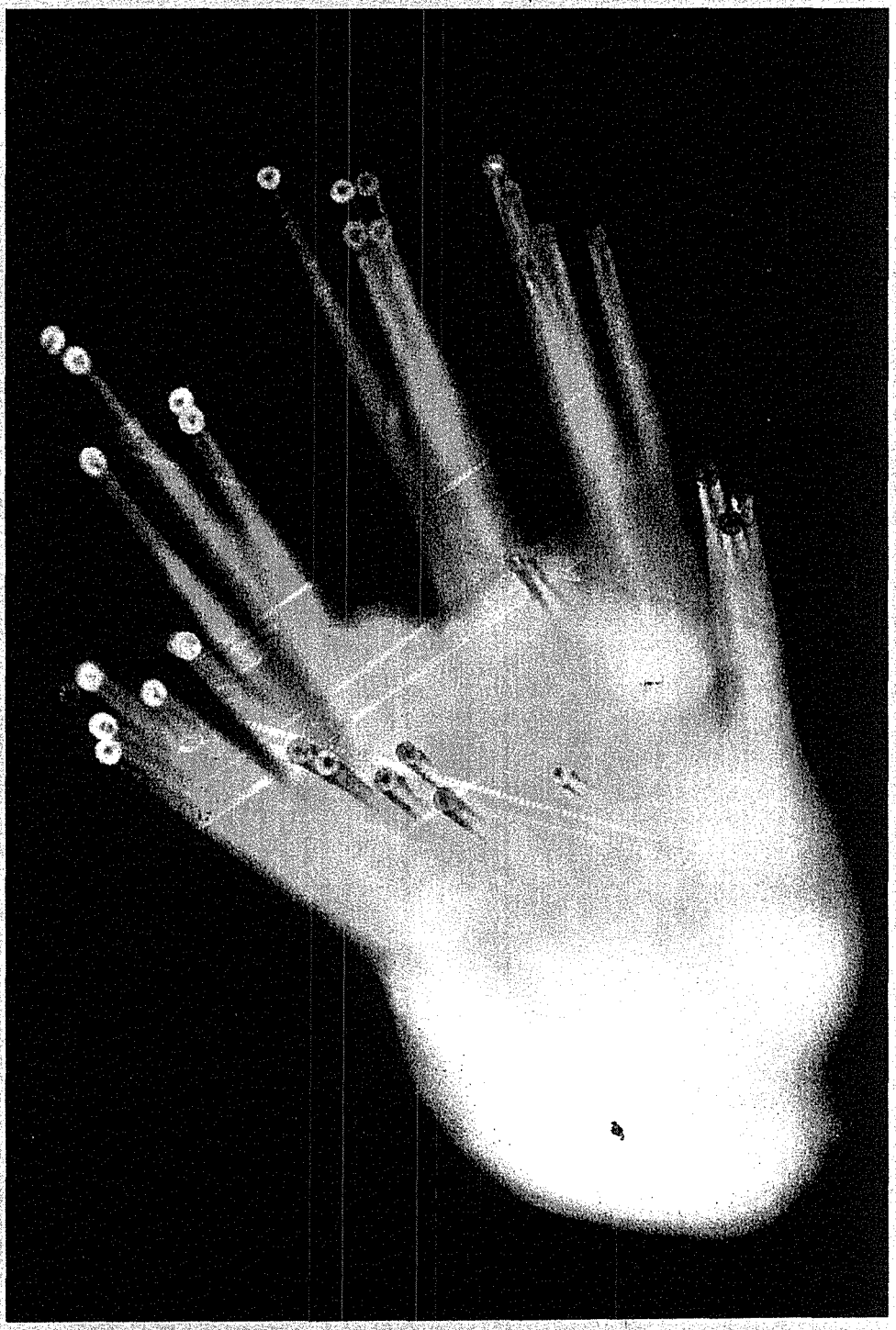
TEACHER RESOURCE BOOK

DYNAMIC SCIENCE



D. WILSON • M. BAUER

Barrier game: Electricity and magnetism

Person 1

The aim of this game is to find out (by talking—*not* looking) which of your pictures are the same as those of your partner and which of your pictures are different. Some differences are very small. In your notebook record beside each number 1–12 whether your picture is the same or different.

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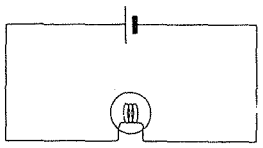

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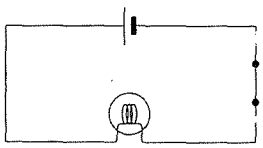

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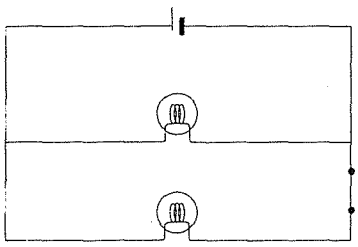

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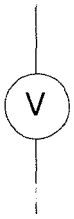

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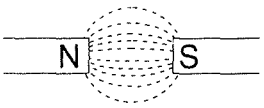

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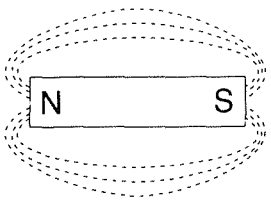

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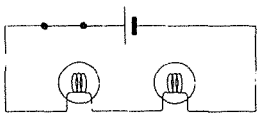

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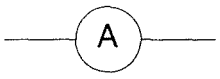

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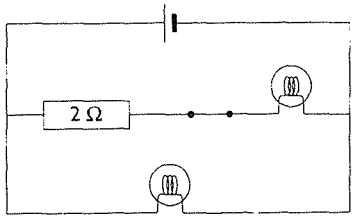

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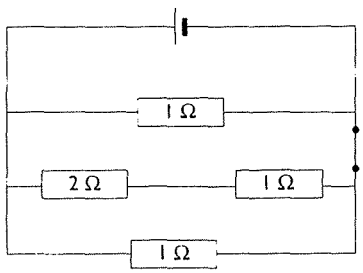

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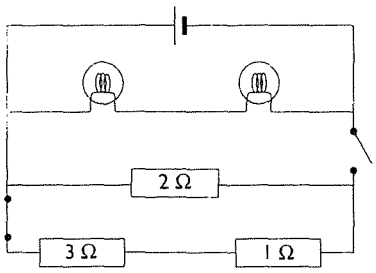

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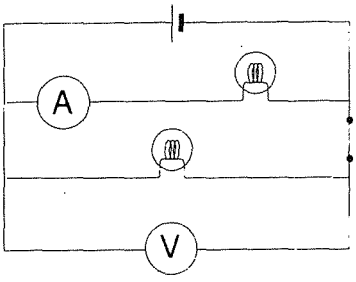

Barrier game: Electricity and magnetism

Person 2

The aim of this game is to find out (by talking—*not* looking) which of your pictures are the same as those of your partner and which of your pictures are different. Some differences are very small. In your notebook record beside each number 1–12 whether your picture is the same or different.

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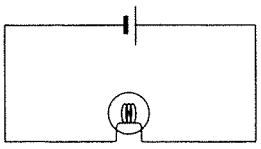

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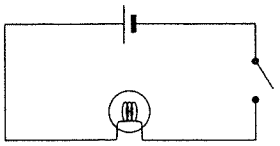

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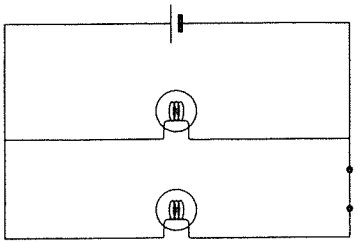

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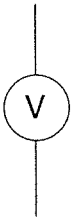

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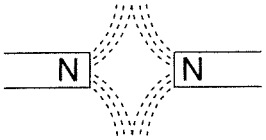

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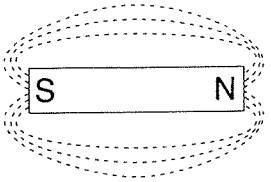

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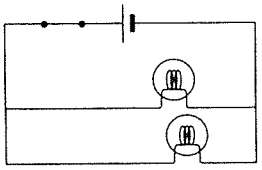

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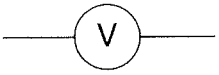

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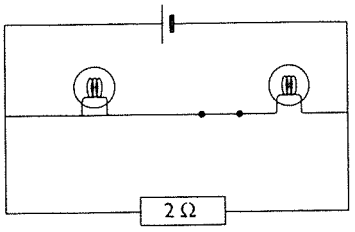

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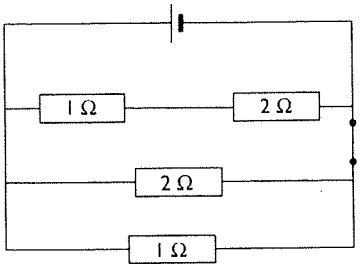

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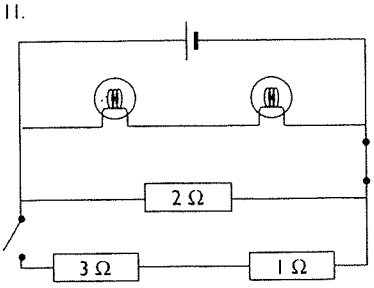

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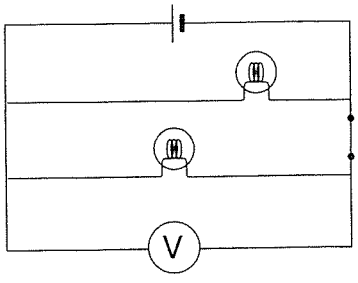


BLM 1b

Meter reading practice: The analogue multimeter

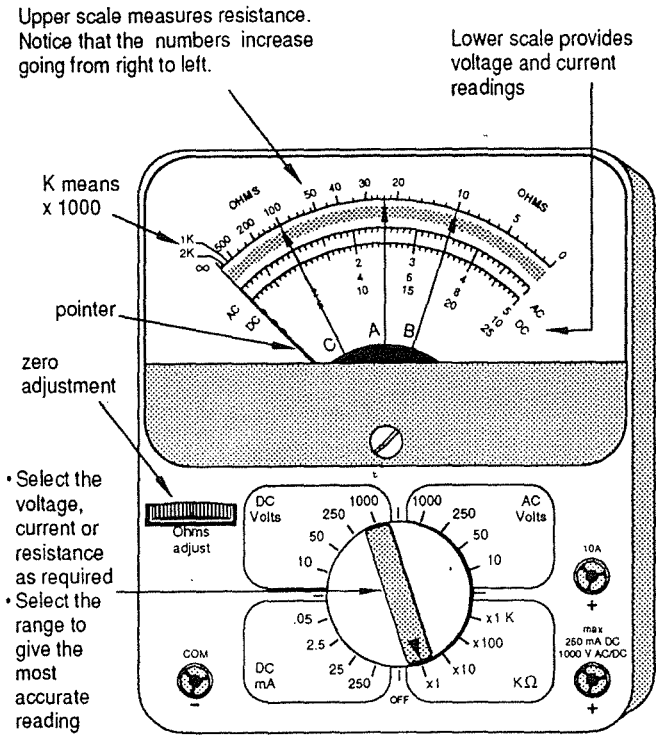
Some meters can measure many quantities. The multimeter in the diagram can measure current, voltage and resistance.

Reading the multimeter scales

For voltage and current readings, the number shown on the selector dial tells you which scale you are using. The table shows you which scale you use and how to read it. Some positions on the selector dial, such as the 10 volts and 25 mA, allow you to obtain the reading directly from the meter. Other positions on the selector dial require you to multiply the value on the scale to obtain the reading.

Quantity	*Selector dial is pointing at*	*Scale used*	*Do I need to change the value?*
Voltage			
dc and ac	10 volts	2,4,6,8,10	no
	50 volts	1,2,3,4,5	× value by 10
	250 volts	5,10,15,20,25	× value by 10
	1000 volts	2,4,6,8,10	× value by 100
Current			
dc current	0.05 mA	1,2,3,4,5	× value by 0.01
	2.5 mA	5,10,15,20,25	× value by 0.1
	25 mA	5,10,15,20,25	no
	250 mA	5,10,15,20,25	× value by 10
Resistance			
KΩ	× 1	*upper scale	no
	× 10	*upper scale	× value by 10
	× 100	*upper scale	× value by 100
	× 1K	*upper scale	× value by 1000

* *Note:* Resistance increases from right to left



Exercise

1. For positions B and C, obtain all readings from the 16 scales. Record your answers in the table. Example A is completed for you.

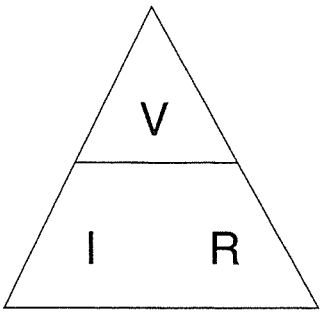
Position on selector	*dc and ac volts*				*dc mA*				*KΩ*			
	10	50	250	1000	0.05	2.5	25	250	×1	×10	×100	×1000
A	5	25	125	500	0.025	1.25	12.5	125	24	240	2400	24K
B												
C												

2. On the multimeter, draw in arrows to represent:
   D: 5 ohms, E: 4 A using the 0–5 A scale, F: 10 A using the 0–25 A scale.

Extension activity

If there is a multimeter, learn how to use it. Use it in some of your circuits for Chapter 1. (Notice that you do not need to use Ohm's law if you read the resistance directly.)

Using Ohm's law



Remember $V = IR$

or $I = \frac{V}{R}$

or $R = \frac{V}{I}$

where V is measured in volts (V)
I is measured in amperes (A)
and R is measured in ohms (Ω)

1. Using Ohm's law, ($V = IR$) calculate the voltage in a circuit where:

	Current I (A)	*Resistance R (Ω)*	*Voltage V (V)*
(a)	3	2	
(b)	5	4	
(c)	7	3	
(d)	10	12	
(e)	15	10	

2. Calculate the current (using $I = \frac{V}{R}$) in a circuit where:

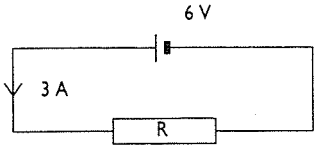
	Voltage V (V)	*Resistance R (Ω)*	*Current I (A)*
(a)	20	10	
(b)	240	24	
(c)	12	3	
(d)	6	1.5	
(e)	8	4	

3. Calculate the resistance (using $R = \frac{V}{I}$) in a circuit where:

	Voltage V (V)	*Current I (A)*	*Resistance R (Ω)*
(a)	240	12	
(b)	12	2	
(c)	60	15	
(d)	24	6	
(e)	6	3	

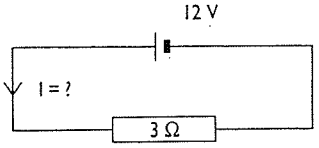
4. Calculate:

(a) the resistance (R)



R = _____

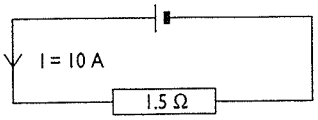
(b) the current



I = _____

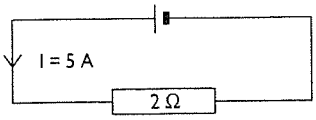
(c) the voltage in circuits (i) and (ii)

(i)



$V_{(i)}$ = _____

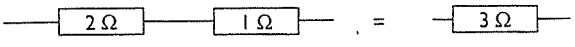
(ii)



$V_{(ii)}$ = _____

Extension work

If two resistors are *in series*, the total resistance is the sum of the two resistances, for example:



What would be the values of $V_{(i)}$ and $V_{(ii)}$ if another 2 Ω resistor was added in series to each circuit?

Reading resistor codes

Resistors are small components, so it is difficult to print numbers on them. Resistors have been colour-coded instead. Small bands of colour appear along the length of the resistor, with three bars usually closer to one end than the other.

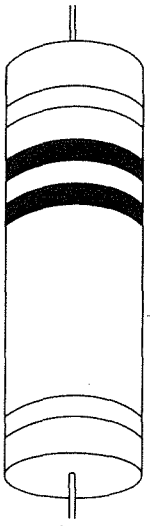
Colours and their values

Black	= 0
Brown	= 1
Red	= 2
Orange	= 3
Yellow	= 4
Green	= 5
Blue	= 6
Violet	= 7
Grey	= 8
White	= 9
(Gold	= × 0.1)
(Silver	= × 0.01)

Band 1 gives the first number (3)
Band 2 gives the second number (2)
Band 3 indicates the number of zeros to add to the first two numbers (1 zero in example)
Band 4 gives the tolerance or accuracy of the resistor

Note: red = ±2%
gold = ±5%*
silver = ±10%*
no band = ±20%

* most common tolerances



Coloured bands
For example:
orange → 3
red → 2
black → 0 zero
32 Ω

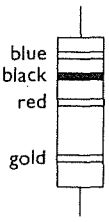
Gold or silver bands
If gold:
32 Ω ± 5%
If silver:
32 Ω ± 10%

Reading the code

Start at the end closer to the three bands. If you cannot decide where to start, choose the end opposite to the silver or the gold band.

Exercise

1. (a)



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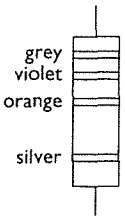
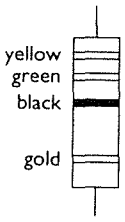


(c)



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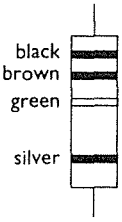

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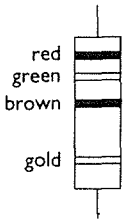

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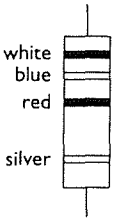
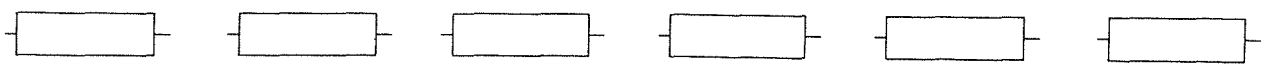


2. Construct diagrams of resistors having the following resistance values:

(a) 35Ω ±10%
(b) 2500Ω ±10%
(c) 7600Ω ±5%
(d) 400 000Ω ±10%
(e) 18 000Ω ±10%
(f) 3900Ω ±5%

(a) (b) (c) (d) (e) (f)



The cost of power

Here is a sample electricity account:

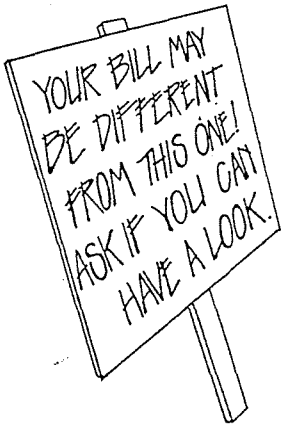
Domestic charge	*Last reading*	*This reading*	*kW.h used*	*$*
Domestic				
First 300 kW.h at 15c per kW.h	60 300	60 600	300	45.00
Remainder 1200 kW.h at 10c per kW.h	46 000	47 200	1200	120.00
			Subtotal	165.00
Offpeak tariff				
1100 kW.h at 5c per kW.h	28 900	30 000	1100	55.00
			Subtotal	55.00
			This period's electricity charge	210.00

Notice # the first 300 kW.h is charged at a higher rate than the remainder
the offpeak tariff is much lower than the usual charge

The offpeak tariff is usually associated with hot water services or central heating, where power is supplied during the low-demand evening hours.

Using the sample as a guide, assuming that all charges are the same, complete the following account:

Domestic charge	*Last reading*	*This reading*	*kW.h used*	*$*
Domestic				
First 300 kW.h at 15c per kW.h	45 800	46 100	_____	_____
Remainder 1500 kW.h at 10c per kW.h	32 000	33 500	_____	_____
			Subtotal	_____
Offpeak tariff				
800 kW.h at 5c per kW.h	17 500	18 300	_____	_____
			Subtotal	_____
			This period's electricity charge	_____

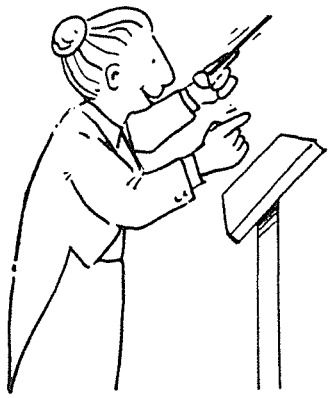


1. Why do you think that the:
   (a) first 300 kW.h are the most expensive?
   (b) offpeak rate is the least expensive?

2. Use the table to answer the following questions:
   (a) Assuming the cost per kW.h to be 15c, what would be the cost per kW.h for each of the above appliances?
   (b) Which would cost more to run:
      (i) a clock radio for 60 hours or a cassette recorder for 40 hours?
      (ii) a small fan for 10 hours or an electric jug for 3 minutes?

Appliance	*Power usage after 1 hour (kW.h)*
Clock radio	0.005
Cassette recorder	0.010
Small fan	0.020
Light globe	0.060
Sander	0.160
Hair dryer	1.250
Electric jug	2.400

Superconductor discoverers



The two people who first discovered a superconductive ceramic substance won the 1987 Nobel Prize for physics for their efforts. Who were these people? One was Swiss and one was from Germany.

- Answer the questions.
- Read the letters down the column indicated to find the names of these people.

1. Unit of resistance	___	_	
2. A substance that does not conduct electricity	____	_	_____
3. Part of a light globe that glows	___	_	_____
4. Unit of power	___	_	_____
5. Ampere is the unit for this measured quantity	____	_	____
6. Opposition to the flow of current		_	_____
7. Current whose direction constantly changes	_____	_	_____
8. Another name for a power pack	____	_	_____
9. Current obtained from a battery		_	_____
10. Place where experiments are carried out	___	_	_____
11. Meter used to measure voltage	_____	_	____
12. Area over which a force acts	_____	_	
13. Device that 'produces' electrical power	___	_	_____
14. Instrument used to detect static charge	_____	_	_____
15. The way in which circuits are wired in a house	___	_	_____
16. Element number 40, used in some photo flash bulbs		_	_____

Research

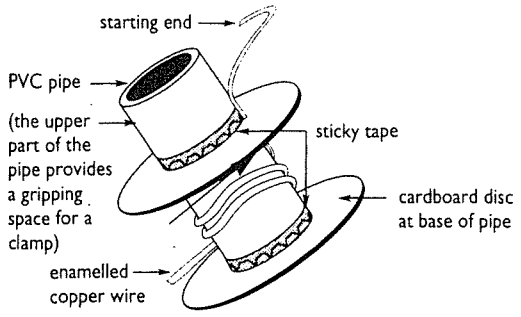
Find out more about superconductors. Why is there so much interest in these substances?

Making a coil with 500 turns

What you need:

- # piece of PVC plastic water pipe, approximately 7 cm long and 19 mm internal diameter
- # 3 circles of stiff cardboard, approximately 7 cm diameter
- # approximately 200 g of enamelled copper wire (often about 1½ reels)
- # sticky tape
- # packaging tape
- # sandpaper
- # scissors to cut circles
- # wire cutters

(a)



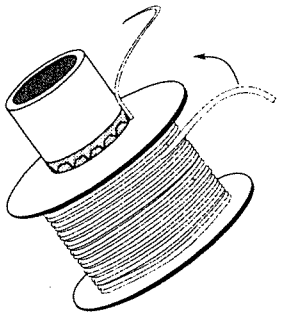
What you do:

1. Make suitably sized holes in 3 of the cardboard circles.
2. Attach 2 of the discs to the PVC pipe as shown in diagram (a).
3. Leave 30 cm of copper wire and start winding the copper wire onto the tube, between the cardboard circles.

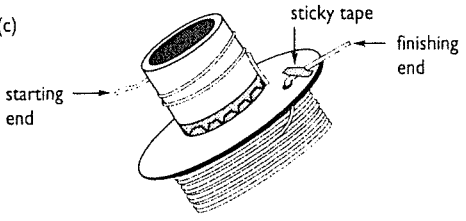
   Note: Winding must be in one direction only.

4. Keep winding until one coil has been used.
5. Using the sandpaper, sand the ends of the copper wire from the used reel and the new reel.
6. Twist the bared ends of the copper wires together, and continue winding in the same direction until approximately ½ of the new reel has been wound onto the coil as shown in diagram (b).
7. Finish winding at the end you started, leaving about 20 cm of wire, and cut.
8. Make a small hole in the top disc of cardboard.
9. Thread the finishing 20 cm of wire through the hole.
10. Stick the end to the disc with sticky tape as shown in diagram (c).
11. Now wind the starting end around the tube above the top disc, making sure that you wind it *in the same direction*, as shown in the diagram.
12. Push the third disc over the tube and keep it in place with sticky tape.
13. Cover the coil securely with packaging tape leaving the ends of the coil free as shown in diagram (d).
14. Sand the enamelling from the free ends. Your coil is ready to use.

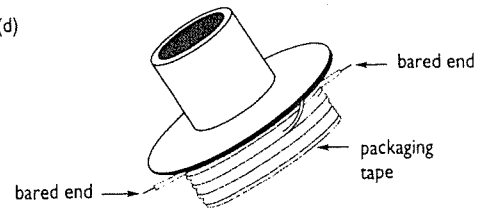
(b)



(c)



(d)



This coil may be used for 'Activities 1.12: Making a magnet', and '1.13: Do alternating and direct currents cause the same magnetic effects?'. You could also use it to repeat 'Activity 4.6: Electricity in a coil' from Book 2.

Activities 2.3 and 2.4

Activity 2.3: How much air is present in soil?

What you need:

- # 2 measuring cylinders (250 mL)
- # soil samples
- # stirring rod

What you do:

1. Measure 50 mL of water in one measuring cylinder.
2. Add soil to the other measuring cylinder, up to the 50 mL mark.
3. Record the expected volume of the soil and water mixture. This measurement is the original soil-water volume.
4. Transfer the 50 mL of water into the soil in the second measuring cylinder.
5. Observe your sample closely.
6. Stir the mixture carefully or allow the soil-water mixture to stand overnight.
7. Record your observations and the actual volume of the soil-water mixture. This measurement is the final soil-water volume.
8. Repeat steps 1 to 5 for at least 2 other soil samples.

Results

For each soil sample:

(a) Work out the volume of air in the soil sample by:

initial soil/water volume (from step 3) − final soil/water volume (from step 7)

(b) Work out the percentage of air in each soil sample:

$$\%\text{ of air} = \frac{\text{volume from calculation (a)}}{50\text{ mL}\dagger} \times 100$$

Note: † = (volume of soil initially)

Exercise

List the percentage of air present in the samples of soil that you tested.

Activity 2.4: How much water is present in soil?

What you need:

- # accurate scales
- # evaporating basin
- # heating equipment (tripod, heat-proof mat and Bunsen burner)
- # 2 soil samples

What you do:

1. Weigh the clean, dry evaporating basin
2. One-third fill the evaporating basin with the first soil sample.
3. Reweigh the basin containing the soil.
4. In a well-ventilated area, gently heat the basin, until no more steam can be seen rising.
5. Allow the basin to cool.
6. Reweigh the basin and its contents.
7. Repeat steps 1-6 for the second sample.

Results

(a) Basin only = _____ g

(b) Basin + soil before heating = _____ g

(c) Basin + soil after heating = _____ g

(d) Difference in mass before and after heating = _____

You may like to calculate the percentage of mass lost by the soil, using the following formula:

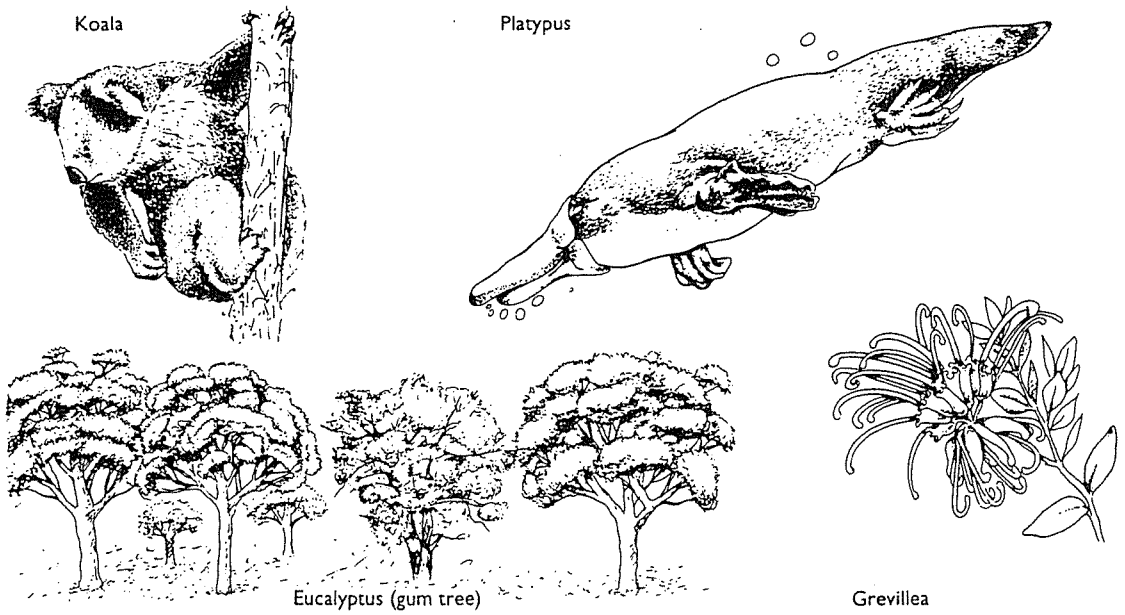
$$\frac{\left(\begin{matrix}\text{Basin + soil}\\ \text{before heating}\end{matrix}\right) - \left(\begin{matrix}\text{basin + soil}\\ \text{after heating}\end{matrix}\right)}{\left(\begin{matrix}\text{Basin + soil}\\ \text{before heating}\end{matrix}\right) - \text{(basin only)}} \times 100$$

Questions

1. Compare the mass lost by the two samples.
2. Does the mass lost actually give the amount of water present? Explain your answer.

Adaptations

Consider the following plants and animals:



- Koala
  —eats only special eucalyptus leaves
  —has two 'thumbs' to assist climbing
  —is nocturnal
  —has pouches

- Platypus
  —burrows in river banks
  —lays eggs
  —feeds young with milk
  —adult has bony plates (no teeth) for grinding food

- Eucalyptus tree
  —has oily leaves
  —leaves hang vertically in the mid-day sun

- Grevillea
  —spiky leaves
  —bright flowers to attract insects

Question
Explain how these particular adaptations help these life forms to survive. Answer in your notebook.

Creative exercise: Planet Coloura
Imagine that your spacecraft is hovering over the largely unexplored planet, Coloura. You have been assured by the galactic government that the life forms here are friendly and that there is adequate water and oxygen available for your crew.

With your strongest telescope, you are able to see:

- rugged mountain ranges
- seas of purple liquid
- extreme brightness due to the closeness of the two 'suns' in the sky
- strange blue 'trees'
- large living creatures running across open pink plains

Your other sensing equipment indicates that the plant life has a very strong and pleasant odour, and that the planet has a fairly constant temperature of 25°C.

Before landing, consider the possible life forms you are likely to meet on Coloura. You and your crew have decided to draw some of the types of plants and animals you think you may encounter.

(a) Consider the types of adaptations that a Coloura plant and animal may need, to exist.

(b) Draw and label one example of a plant and an animal.

(c) Compare your life forms with those of other students.

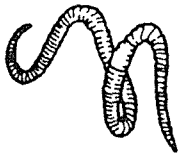
(d) Make a display of your drawings.

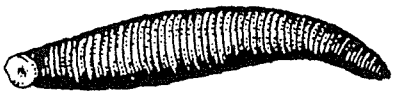
Some organisms in the environment


Spider


Snail


Cockroach


Earthworm

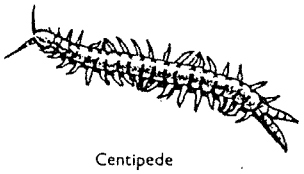

Leech


Bee


Millipede


Moth

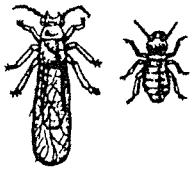

Grasshopper


Centipede


Cricket


Beetle


Beetle larva


Termite
(White ant)


Earwig


Slug

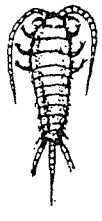

Fly


Caterpillar


Ladybird


Slater


Ant


Silverfish

BLM 10

How many bees in the swarm?

39	65	76	45	19	90	69	64	61	26	36	31	62	58	24
73	71	23	65	97	12	14	31	56	34	19	47	83	19	75
72	28	47	33	84	51	67	47	97	19	98	40	17	66	23
75	17	25	69	17	95	21	78	58	24	33	45	77	48	69
37	48	79	88	74	63	52	06	34	31	64	27	35	79	71
89	16	94	85	53	83	29	95	56	27	24	43	21	78	55
87	18	15	37	79	49	12	38	48	13	93	55	96	41	92
98	83	71	15	89	39	59	24	41	29	14	36	59	25	47
58	76	62	16	48	68	58	76	17	14	86	59	53	15	52
47	56	37	31	71	82	13	41	27	55	24	92	28	67	53
93	31	34	18	52	35	74	13	39	35	22	68	95	23	92
21	89	11	47	99	11	97	45	18	76	51	94	84	86	13
95	18	94	97	27	37	83	28	71	79	57	95	13	91	61
97	31	55	73	65	81	92	59	77	31	61	46	44	32	64
69	26	88	86	13	59	71	74	17	32	44	38	75	93	29

How to use the random number table

1. Start anywhere. (You may choose your starting point by closing your eyes and using a pen to point towards the table.)
2. Move diagonally, vertically or horizontally in the table, until you have ten numbers.
3. Write each number down.
4. Beside each number, record the number of bees found in that square.

For example, square 97 is found by moving across to 9 on the *x*-axis and up to 7 on the *y*-axis. Once you have found square 97, count the number of bees in it, and record the number.

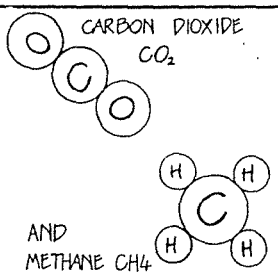
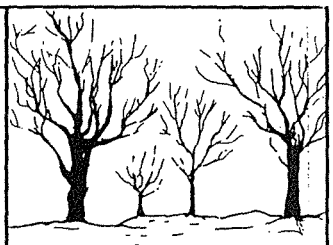
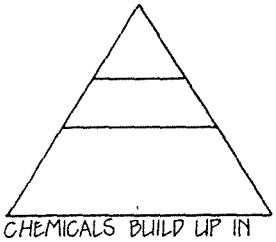
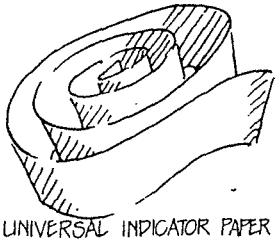
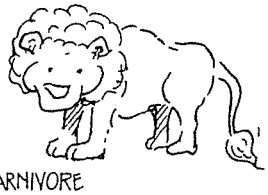
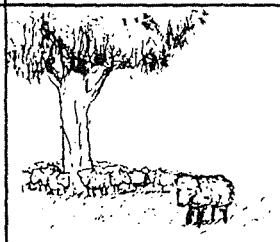
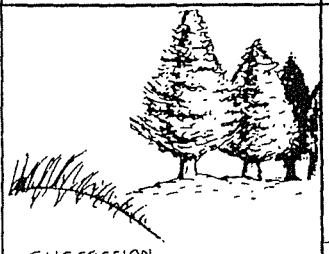
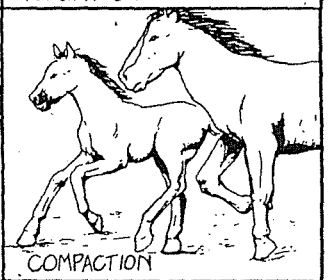
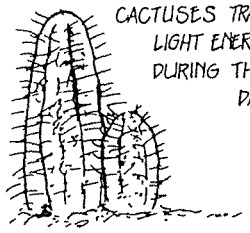
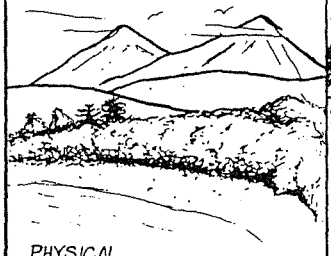
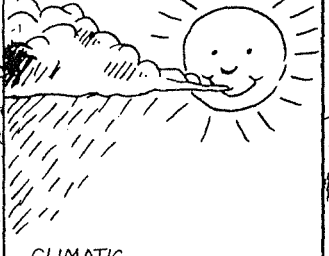
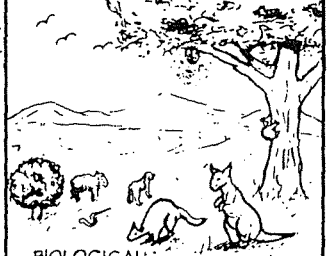
Once you have your number of bees in each of the ten squares:

- Find the total number of bees in the ten squares.
- Multiply by ten to obtain an approximate number of bees in the swarm.
- Compare your number of bees with those of other students.

Results:

Square number	*Number of bees*
Total	
Total × 10	

Keeping the balance: Bingo cards

 CHLOROFLUOROCARBONS		 FERTILISERS IN RUN-OFF	 SOIL SALINATION
 CHEMICALS BUILD UP IN THE FOOD CHAIN	 SILVER NITRATE	 UNIVERSAL INDICATOR PAPER	 METHYLENE BLUE
 PRODUCER	 HERBIVORE	 CARNIVORE	 POPULATION
 DISTRIBUTION	 ABUNDANCE	 SUCCESSION	 COMPACTION
 CACTUSES TRAP LIGHT ENERGY DURING THE DAY FUNCTIONAL	 STRUCTURAL	 BEHAVIOURAL	 NATIONAL PARK
 BIODEGRADABLE PRODUCTS	 PHYSICAL	 CLIMATIC	 BIOLOGICAL

Keeping the balance: Bingo clues

Chemicals that cause ozone depletion *[chlorofluorocarbons (CFCs)]*	Major greenhouse gases *[carbon dioxide (Co_2) and methane (CH_4)]*	A cause of eutrophication in streams *(fertilisers in run-off)*	Land-clearing and irrigation may give rise to this problem *(soil salination)*
Biological magnification may occur when... *(chemicals build up in the food chain)*	Chemical used to test for the presence of salts in water *(silver nitrate $AgNO_3$)*	Chemical used to test the pH of water *(universal indicator paper)*	Chemical used to test for the presence of oxygen in water *(methylene blue)*
Plant in a food chain *(producer)*	Plant eater *(herbivore)*	Meat eater *(carnivore)*	Name used to describe total numbers of a particular life form in an area *(population)*
Name given to the total area where a particular life form lives *(distribution)*	Name used to describe how life forms are spread in an area *(abundance)*	Name given to the process by which plants and animals replace each other in a particular area, over time *(succession)*	The process of flattening and removing air from soil *(compaction)*
A type of adaptation that allows a plant or animal (or part of it) to work better *(functional)*	Wax coatings on leaves are an example of this type of adaptation *(structural)*	A platypus burrowing into a riverbank is an example of this type of adaptation *(behavioural)*	Place where conservation of native wildlife is encouraged *(national park)*
Environmentally friendly substance *(biodegradable products)*	Component of the environment that includes landforms *(physical)*	Component of the environment that includes long-term weather patterns *(climatic)*	Component of the environment that includes food, predators and other animals *(biological)*

Answers are in brackets in italics. Do not read them out.

The resort: Role play cards

The developer
- Wants the forest to be opened up, so it can be enjoyed by more people
- Intends to provide employment for local people (hard hit by unemployment)
- Wants to build a major tourist attraction
- Wants to bring more money into the area

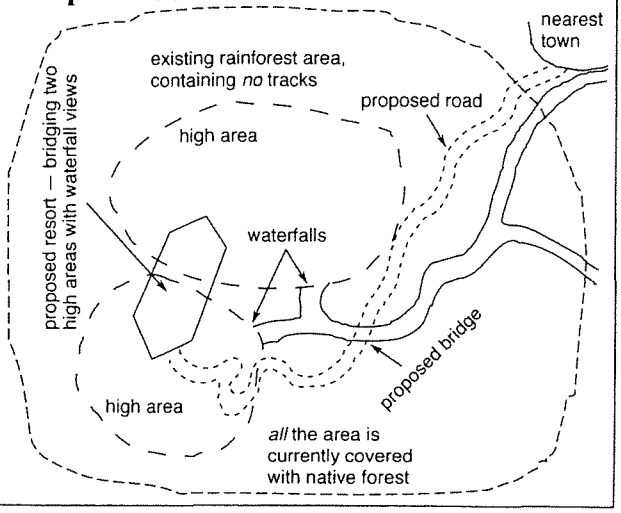
Conservationists
- Want no development on *any* site in the area
- Want to see the area given national-park and heritage-listing status
- Believe jobs could be created by rehabilitating old mine sites in an adjoining area
- Suggest that tourists be given limited (walking) access to one corner of the proposed resort area

State government
- Wants to see jobs created
- Is uncertain about destruction of a sensitive rainforest area
- Is concerned about loss of the conservationists' votes in the imminent election
- Is keen to encourage tourism

Local people
- Want jobs
- Believe other areas could be kept in their natural state, so that the resort could be developed
- Are concerned that tourism might upset their peaceful rural atmosphere
- Are distrustful of the developer

State opposition
- Does not want development in that particular area
- Has suggested development in a nearby area that is not so environmentally sensitive
- Is keen to encourage tourism
- Is keen to convince conservationists that its policies are more appropriate than those of the current government

Map of area



Useful tables

Table 3.1: *Compounds and their component elements*

Compound	*Metallic element*	*Non-metallic element*
Magnesium oxide	magnesium	oxygen
Lead sulfide	lead	sulfur
Sodium chloride	sodium	chlorine
Potassium bromide	potassium	bromine
Calcium chloride	calcium	chlorine

Table 3.2: *Surnames of salts produced from certain acids*

Acid	*Surname of salt formed*
Hydrochloric	chloride
Sulfuric	sulfate
Nitric	nitrate

Table 3.3: *Some common compounds and their formulas*

Compound	*Formula including its usual state*	*Formula when dissolved in water*
Water	$H_2O_{(l)}$	—
Acids		
Hydrochloric	—	$HCl_{(aq)}$
Nitric	—	$HNO_{3(aq)}$
Sulfuric	—	$H_2SO_{4(aq)}$
Alkalis		
Potassium hydroxide	$KOH_{(s)}$	$KOH_{(aq)}$
Sodium hydroxide	$NaOH_{(s)}$	$NaOH_{(aq)}$
Salts		
Cobalt (II) chloride	$CoCl_{2(s)}$	$CoCl_{2(aq)}$
Cobalt carbonate	$CoCO_{3(s)}$	—
Copper (II) chloride	$CuCl_{2(s)}$	$CuCl_{2(aq)}$
Copper (II) sulfate	$CuSO_{4(s)}$	$CuSO_{4(aq)}$
Lead (II) nitrate	$Pb(NO_3)_{2(s)}$	$Pb(NO_3)_{2(aq)}$
Lead (II) chloride	$PbCl_{2(s)}$	—
Magnesium chloride	$MgCl_{2(s)}$	$MgCl_{2(aq)}$
Magnesium sulfate	$MgSO_{4(s)}$	$MgSO_{4(aq)}$
Potassium chloride	$KCl_{(s)}$	$KCl_{(aq)}$
Potassium nitrate	$KNO_{3(s)}$	$KNO_{3(aq)}$
Potassium sulfate	$K_2SO_{4(s)}$	$K_2SO_{4(aq)}$
Sodium carbonate	$Na_2CO_{3(s)}$	$Na_2CO_{3(aq)}$
Sodium chloride	$NaCl_{(s)}$	$NaCl_{(aq)}$
Sodium nitrate	$NaNO_{3(s)}$	$NaNO_{3(aq)}$
Sodium sulfate	$Na_2SO_{4(s)}$	$Na_2SO_{4(aq)}$

Note: All salts do not dissolve. For example, cobalt carbonate and lead chloride do not dissolve in water and so are said to be insoluble.

The first twenty elements

1. Complete the following table. The first element has been done for you.

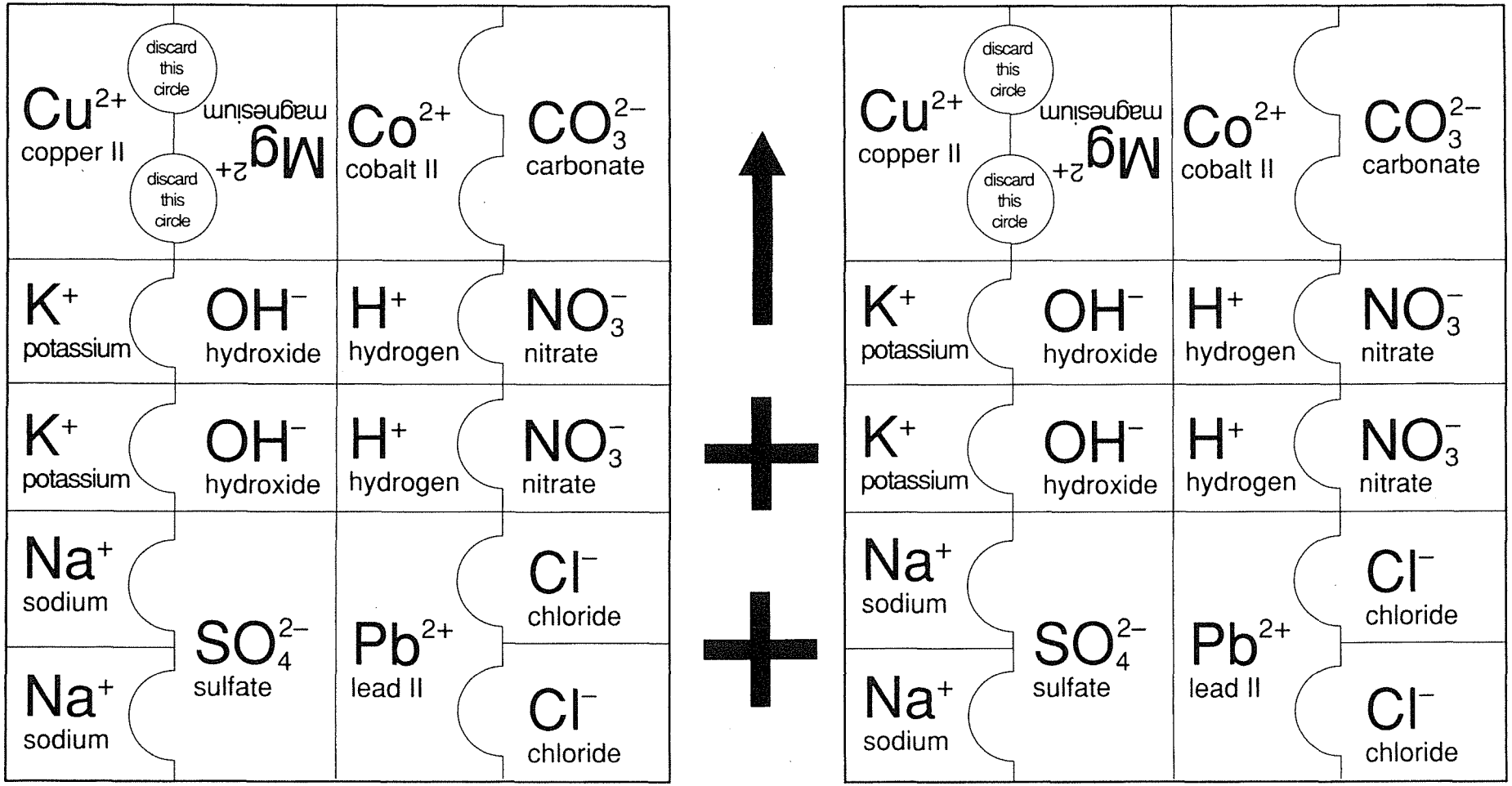
Element	*Symbol*	*Symbol in equations*	*Metal, semi-metal or non-metal*	*Additional information*
Hydrogen	H	$H_{2(g)}$	non-metal	colourless, odourless, explosive gas
Helium				
Lithium				
Beryllium				
Boron				
Carbon				
Nitrogen				
Oxygen				
Fluorine				
Neon				
Sodium				
Magnesium				
Aluminium				
Silicon				
Phosphorus				
Sulfur				
Chlorine				
Argon				
Potassium				
Calcium				

2. Complete the following simplified periodic table:

1							2
3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18
19	20						

Chemical jigsaw pieces

Jigsaw pieces are useful for showing some types of reactions.
Cut out the pieces along the black lines *very* carefully or your jigsaw pieces will not fit.

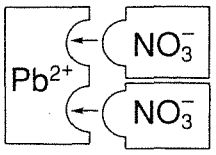
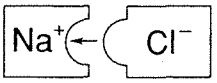
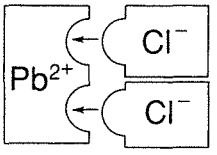
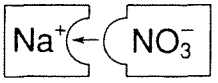


Using the chemical jigsaw

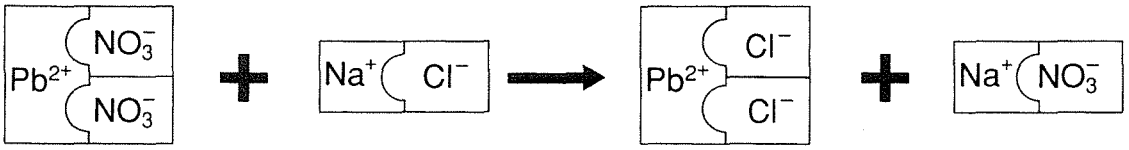
How to use the jigsaw pieces

Consider the reaction: lead II nitrate + sodium chloride → lead II chloride + sodium nitrate

1. *Make up the pattern pieces for each compound.*

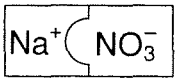
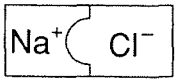
lead II nitrate	sodium chloride	lead II chloride	sodium nitrate
			
2 NO_3^- are needed to balance 1 Pb^{2+}	Only 1 Na^+ is needed to balance 1 Cl^-	2 Cl^- are needed to balance 1 Pb^{2+}	Only 1 Na^+ is needed to balance 1 NO_3^-

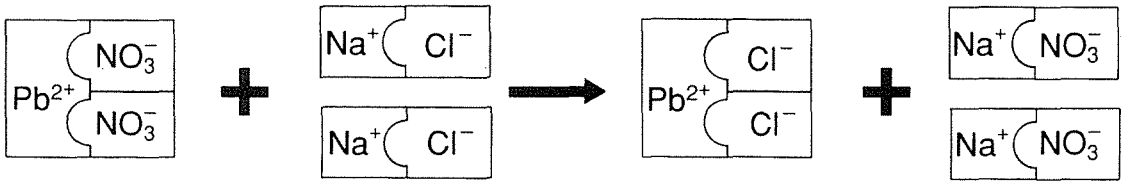
2. *Lay down the pieces of the puzzle.*



3. *Check whether your equation is balanced.*
There are 2 NO_3^- on your left-hand side and only 1 NO_3^- on the right-hand side, and there is only 1 Cl^- on the left-hand side and 2 Cl^- on the right-hand side.

REMEMBER: You must be able to rearrange the left-hand side to form the right-hand side.

In this case, you will need another  and another  to balance the equation. Your final equation becomes:



OR $Pb(NO_3)_2 + 2NaCl \rightarrow PbCl_2 + 2NaNO_3$

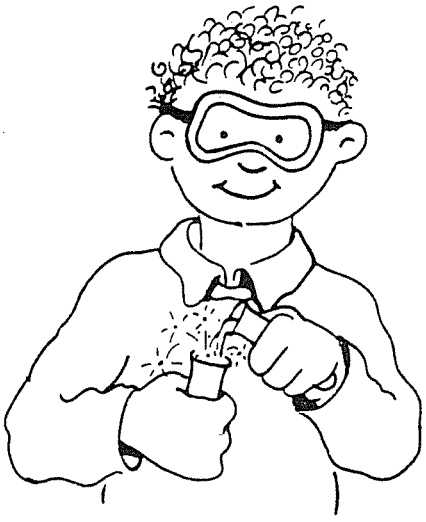
Jigsaws for you to do

1. (a) lead II nitrate + potassium hydroxide → lead II hydroxide + potassium nitrate
   (b) copper II sulfate + cobalt II chloride → copper II chloride + cobalt II sulfate
   (c) magnesium nitrate + sodium carbonate → magnesium carbonate + sodium nitrate
   (d) hydrochloric acid + lead II nitrate → nitric acid + lead II chloride
   (e) sodium hydroxide + magnesium sulfate → sodium sulfate + magnesium hydroxide

2. See how many more balanced equations you can make with your jigsaw pieces.

Challenging chemical equations

Use the textbook to help you to write balanced chemical formula equations for the following reactions. Remember to include the state of the reactants and products. Write your answers in your notebook.
Note: Part(c) of each question requires a word equation answer.



1. Acid + alkali (soluble base)
(a) hydrochloric acid + aqueous sodium hydroxide → aqueous sodium chloride + water
(b) sulfuric acid + aqueous potassium hydroxide → aqueous potassium sulfate + water
Note: Both sodium chloride and potassium sulfate are called salts.
(c) Complete the general word equation:
acid + alkali →

2. Acid + active metal
(a) sulfuric acid + zinc metal → aqueous zinc sulfate + hydrogen gas
(b) hydrochloric acid + magnesium metal → aqueous magnesium chloride + hydrogen gas
Note: Both zinc sulfate and magnesium chloride are salts.
(c) Complete the general word equation:
acid + active metal →
A special reaction may sometimes occur when water reacts with a very active metal. Water may sometimes act as an acid.
(d) sodium metal + water → sodium hydroxide + hydrogen gas

3. Acid + carbonate
(a) hydrochloric acid + solid sodium carbonate → aqueous sodium chloride + carbon dioxide gas + water
(b) nitric acid + aquous potassium carbonate → aqueous potassium nitrate + carbon dioxide gas + water
(c) Complete the word equation:
acid + carbonate →

4. Precipitation—an insoluble substance forms
(a) lead nitrate solution + potassium iodide solution → solid lead iodide + potassium nitrate solution
(b) silver nitrate solution + sodium chloride solution → solid silver chloride + sodium nitrate solution

5. Change the following reactions to word equations
(a) $Mg_{(s)} + 2HNO_{3(aq)} \rightarrow Mg(NO_3)_{2(aq)} + H_{2(g)}$
(b) $HCl_{(aq)} + KOH_{(aq)} \rightarrow KCl_{(aq)} + H_2O_{(l)}$
(c) $2HCl_{(aq)} + CoCO_{3(aq)} \rightarrow CoCl_{2(aq)} + H_2O_{(l)} + CO_{2(g)}$
(d) $Pb(NO_3)_{2(aq)} + 2HCl_{(aq)} \rightarrow PbCl_{2(s)} + 2HNO_{3(aq)}$

Research
Who was John Dalton? What important work did he do? Use library books to find out.

Comprehension: A closer look at the chemistry of limestone caves

Read the following passage and answer the questions that follow:

Carbon dioxide in the atmosphere dissolves in rain water, making most rain slightly acidic. The acid formed when carbon dioxide dissolves in water is called carbonic acid:

carbon dioxide + water → carbonic acid

$$CO_{2(g)} + H_2O \rightarrow H_2CO_{3(aq)} \quad \ldots\ldots 1$$

The calcium carbonate in limestone dissolves in acidic rain water to form soluble calcium hydrogen carbonate:

solid calcium carbonate + aqueous carbonic acid → aqueous calcium hydrogen carbonate

$$CaCO_{3(s)} + H_2CO_{3(aq)} \rightarrow Ca(HCO_3)_{2(aq)} \quad \ldots\ldots 2$$

This solution of calcium hydrogen carbonate may seep through the ground. If the solution reaches an area where there is a low concentration of carbon dioxide, such as a cave, then the calcium hydrogen carbonate reforms calcium carbonate:

aqueous calcium hydrogen carbonate → solid calcium carbonate + aqueous carbonic acid

$$Ca(HCO_3)_{2(aq)} \rightarrow CaCO_{3(s)} + H_2CO_{3(aq)} \quad \ldots\ldots 3$$

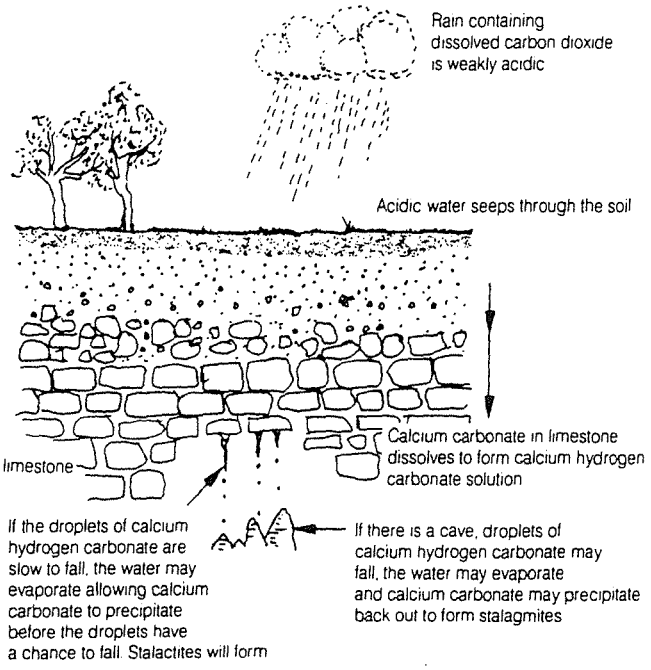
Note: The aqueous carbonic acid forms carbon dioxide and water easily, so the reaction is more correctly:

$$Ca(HCO_3)_{2(aq)} \rightarrow CaCO_{3(s)} + H_2O_{(l)} + CO_{2(g)} \quad \ldots\ldots 4$$

Reaction 4 occurs as the solution of calcium hydrogen carbonate starts to drip from the ceiling of the cave. If the solid precipitate of calcium carbonate is formed before the drop falls, then a stalactite starts to form. If the precipitate forms as the drip lands on the floor of the cave, then a stalagmite starts to form.

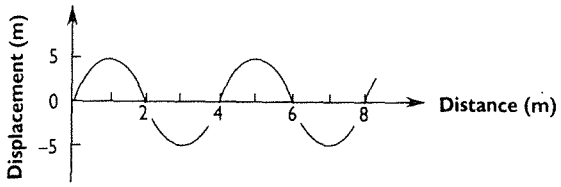
Questions

1. Give the name and chemical symbol for the acid formed when carbon dioxide dissolves in water.
2. What substance forms when limestone reacts with carbonic acid?
3. Under what condition will dissolved calcium hydrogen carbonate produce a precipitate of calcium carbonate?
4. What is formed if the precipitate of calcium carbonate forms:
   (a) before the solution drops from the ceiling?
   (b) when it hits the floor of the cave?
5. Use a scientific dictionary to look up the words: *dissolve*, *soluble*, *solution*, *concentration*, *precipitate*.



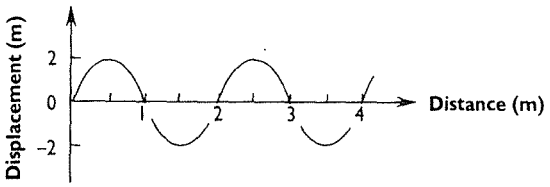
Making waves

1.



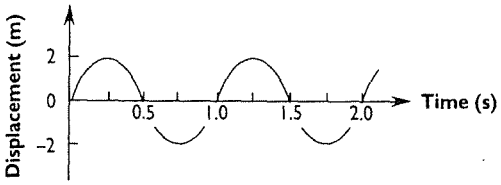
Amplitude = _____ m Wavelength = _____ m

2.



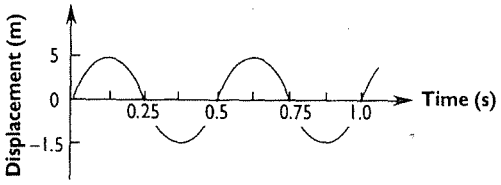
Amplitude = _____ m Wavelength = _____ m

3.



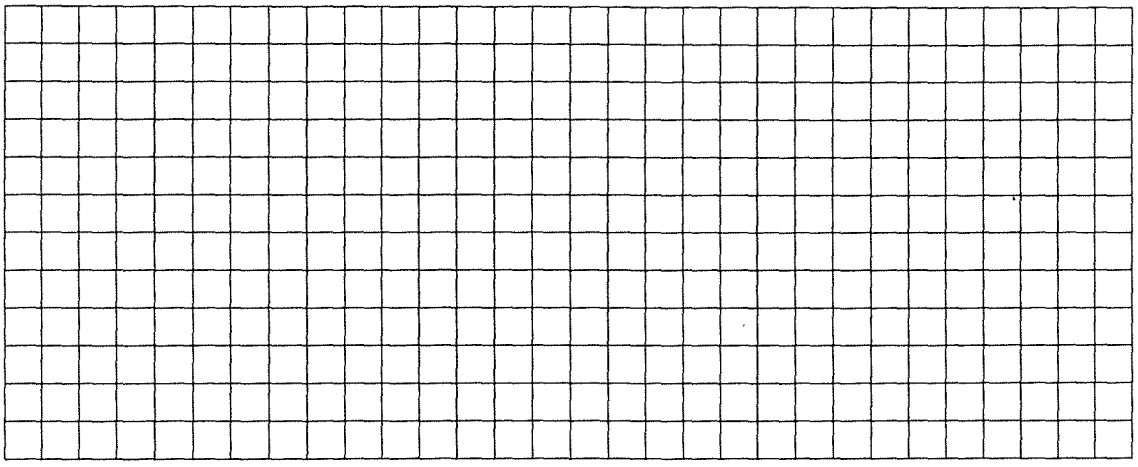
Amplitude = _____ m Frequency = _____ Hz

4.

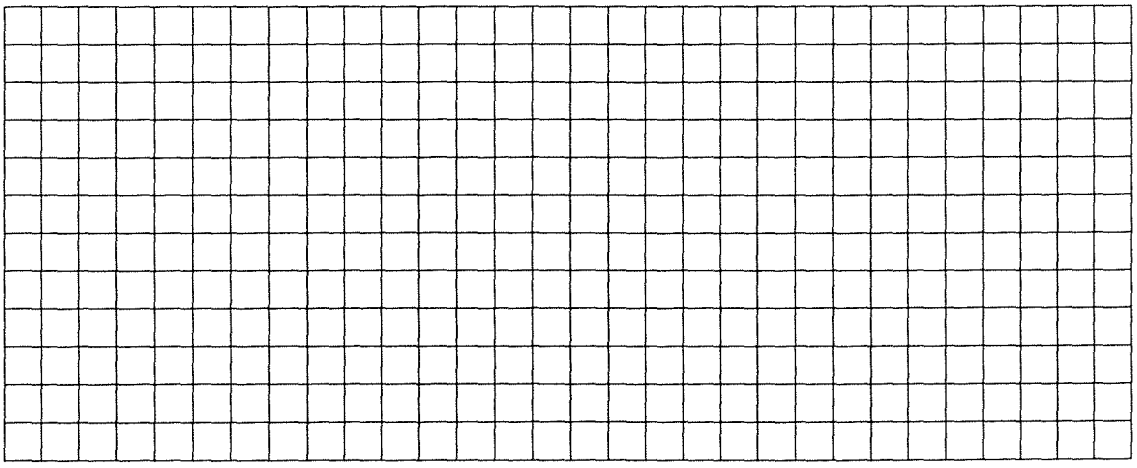


Amplitude = _____ m Frequency = _____ Hz

5. In the grid below, draw a displacement (amplitude)-distance graph for the wave with the following properties: (a) wavelength = 2.0 m (b) amplitude = 0.5 m



6. In the grid below, draw a displacement (amplitude)-time graph for the wave with the following properties: (a) amplitude = 15 m (b) frequency = 0.50 Hz

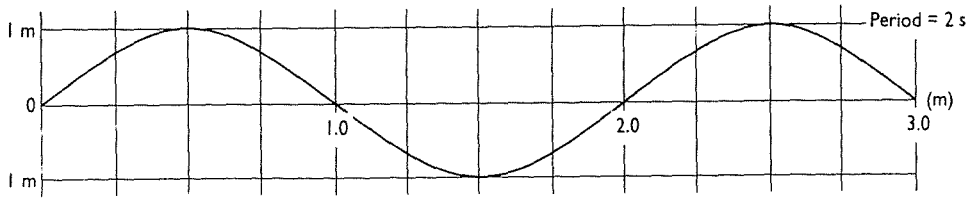


Working with waves

For each of the following waves, determine:

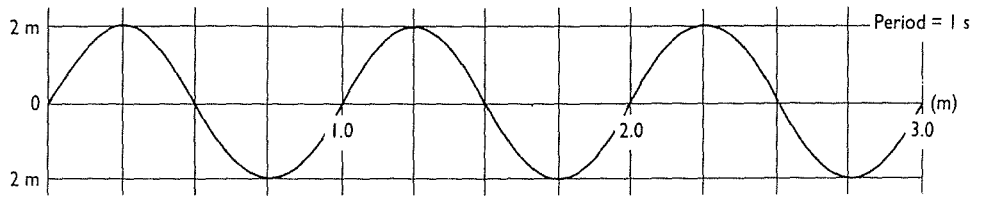
(a) the amplitude
(b) the wavelength (λ)
(c) the frequency (f) (or 1/period)
(d) the velocity of the wave (using $v = f\lambda$)

Example:



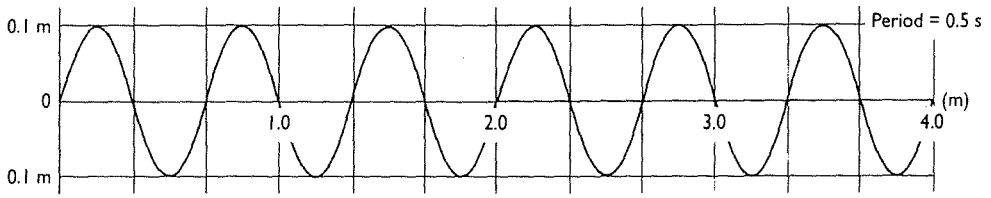
(a) amplitude = 1 m
(b) λ = 2.0 m
(c) f = ½ = 0.5Hz
(d) $v = f\lambda$
$= 2 \times 0.5$
= 1 m/s

1.



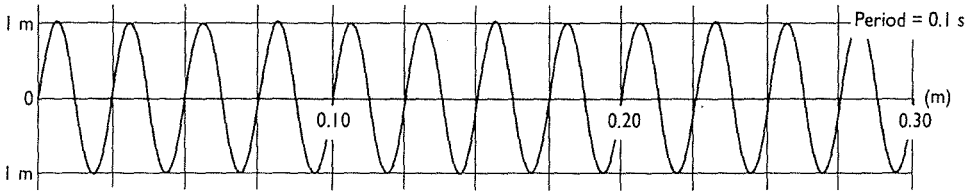
1. (a) amplitude = _____ m
(b) λ = _____
(c) f = _____
(d) v = _____

2.



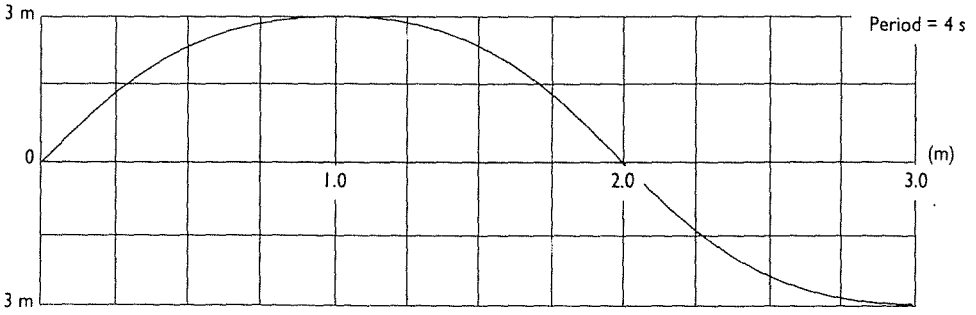
2. (a) amplitude = _____
(b) λ = _____
(c) f = _____
(d) v =

3.



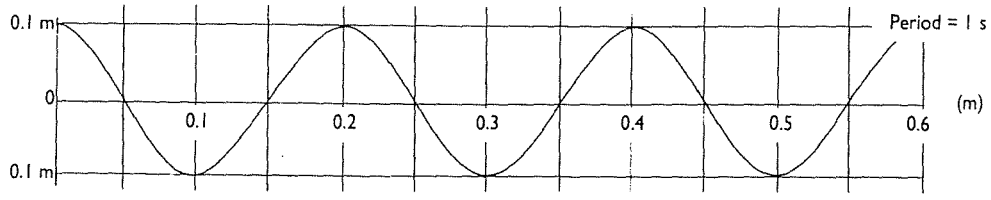
3. (a) amplitude = _____
(b) λ = _____
(c) f = _____
(d) v =

4.



4. (a) amplitude = _____
(b) λ = _____
(c) f = _____
(d) v =

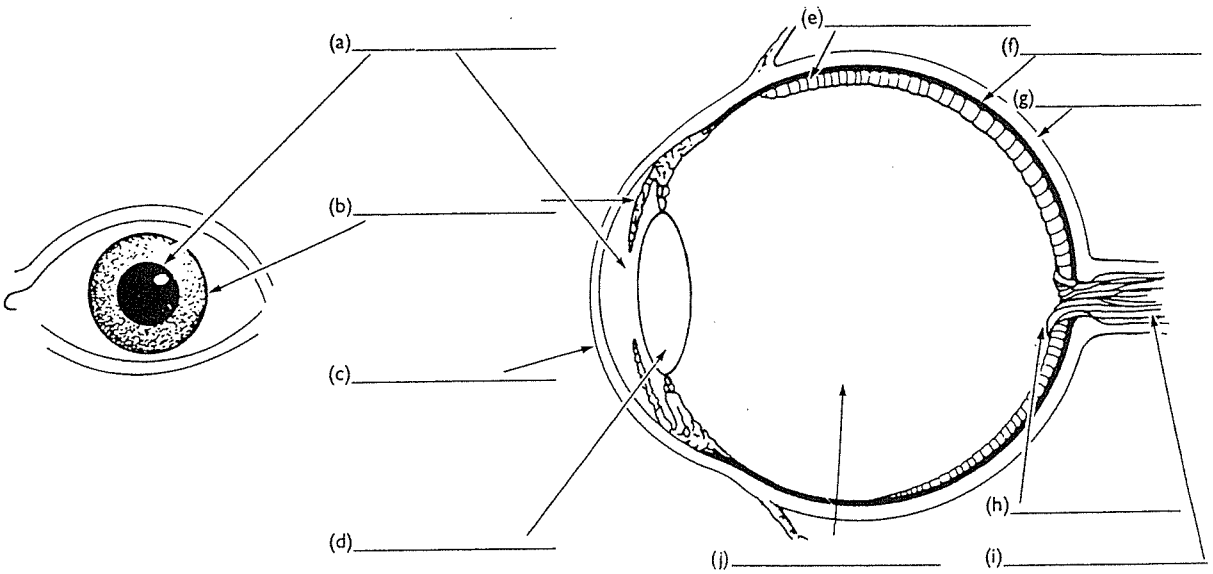
5.



5. (a) amplitude = _____
(b) λ = _____
(c) f = _____
(d) v =

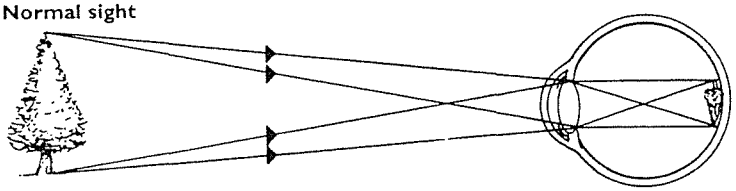
The eye

Label (a) to (e) and any other features

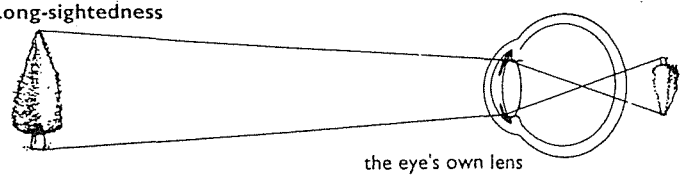


Some eye problems

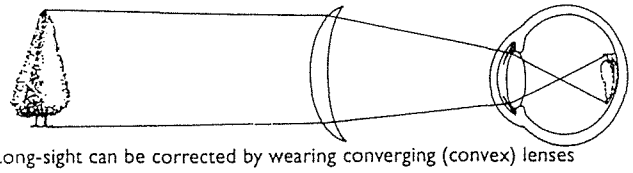
Normal sight



Long-sightedness

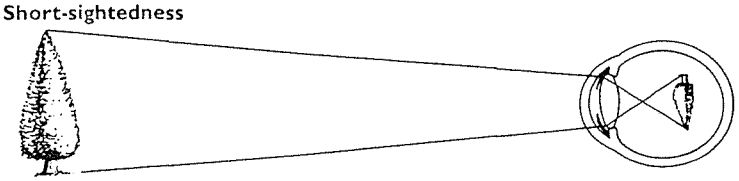


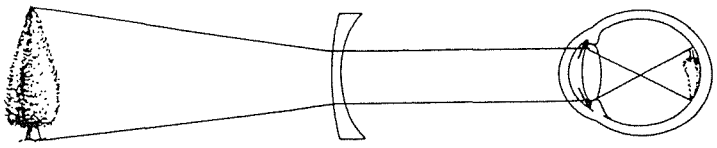
the eye's own lens



Long-sight can be corrected by wearing converging (convex) lenses

Short-sightedness





Short-sight can be corrected by wearing diverging (concave) lenses

To see properly, the image must focus *on the retina* of the eye.

Use the diagrams showing long-sightedness and short-sightedness, to complete the sentences.

Long-sightedness means that people can focus only on distant objects. Close objects appear fuzzy because the rays produce an image _____ the retina.

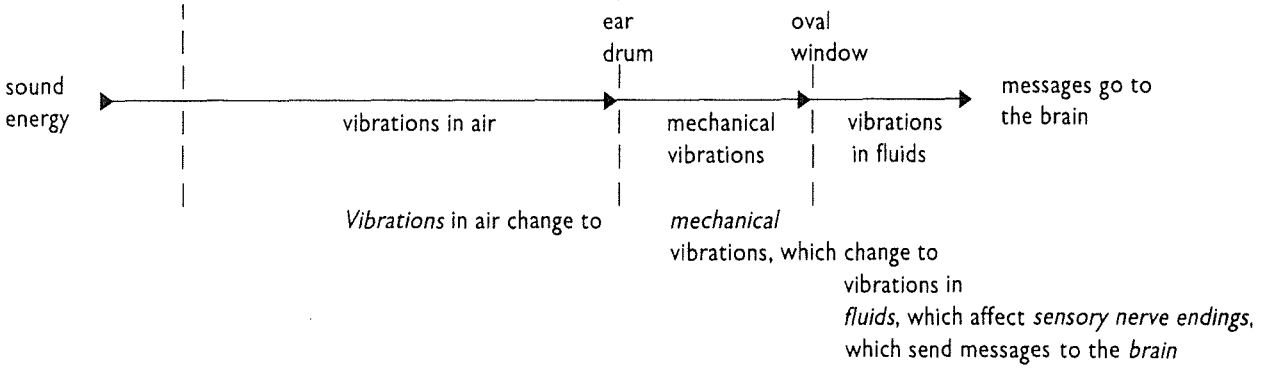
Short-sightedness means that people can focus only on close objects. Distant objects appear fuzzy because the rays produce an image in front of _____ the retina.

Research: Either conduct a survey or use library books to investigate if either of these problems are hereditary.

The ear

1. Label (a) to (l) and any other features.

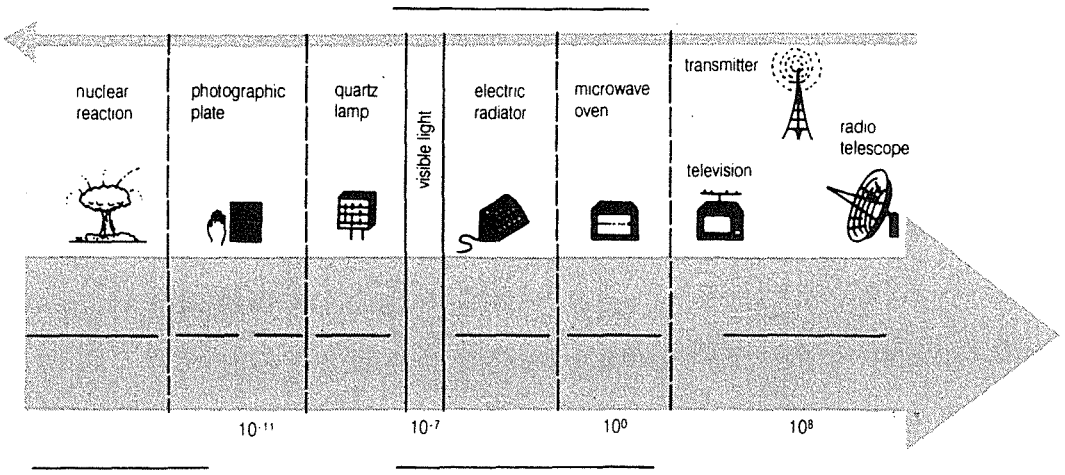
How does sound travel in the ear?



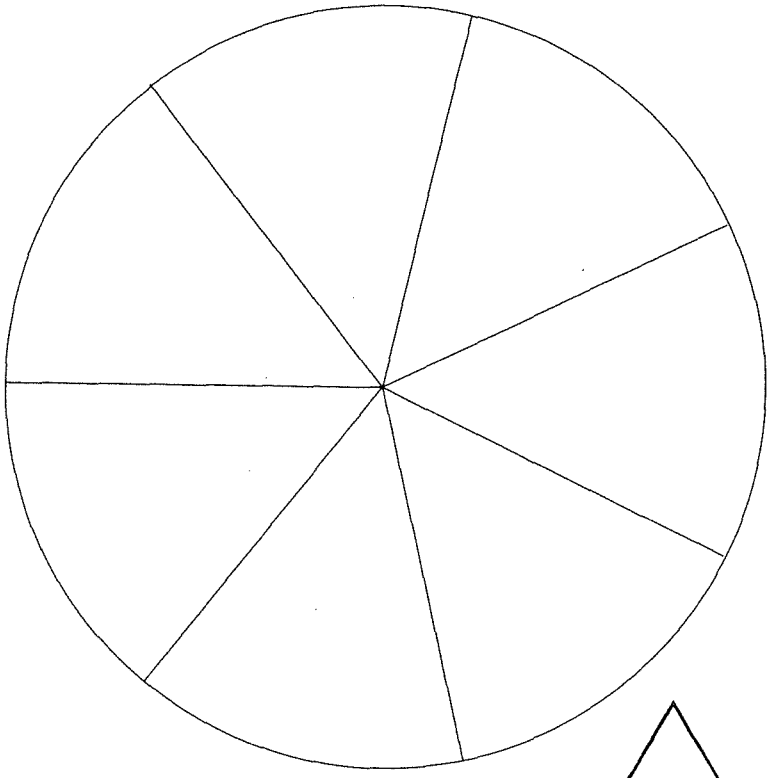
2. Write at least 4 sentences describing how sound is detected by the ear.

Research: Find out about hearing aids.

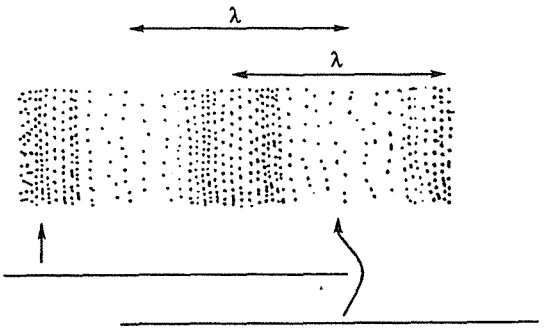
Useful diagrams



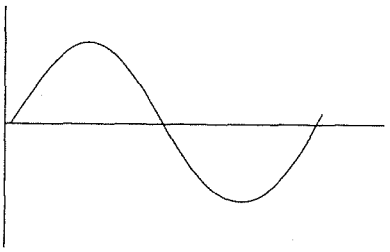
Colour wheel

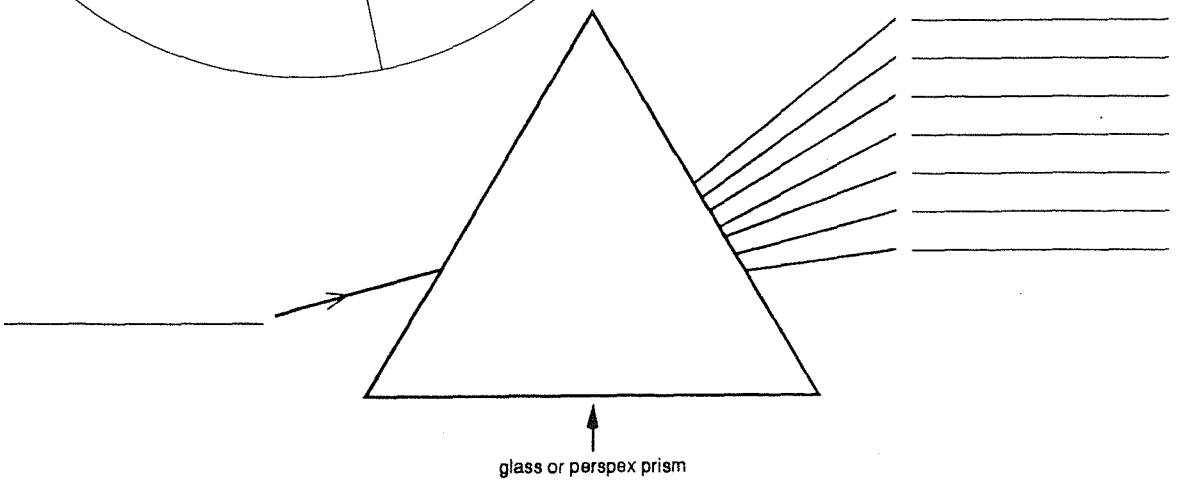


Sound wave



Wave form

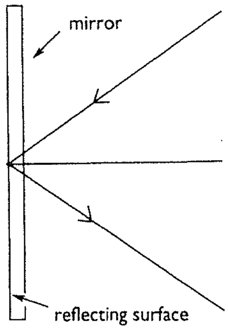




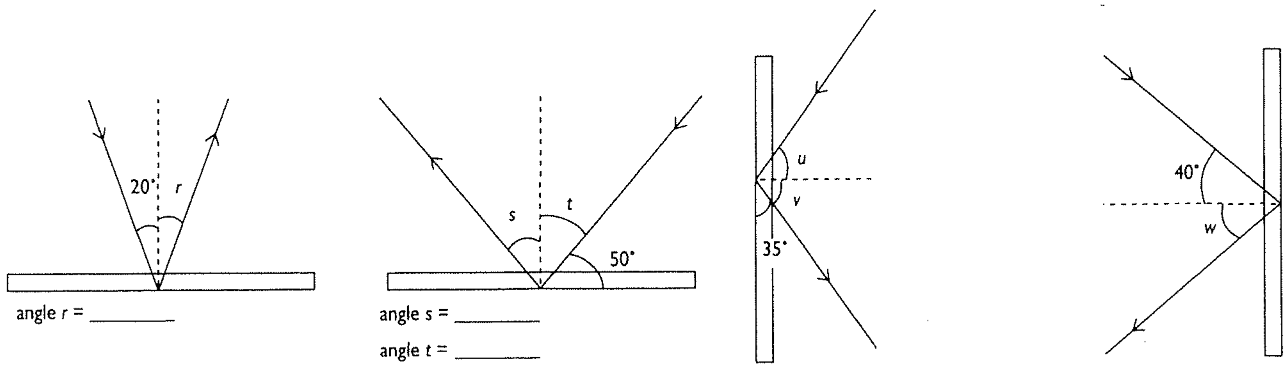
Reflection

Reflection

1. On the diagram label:
   (a) incident ray
   (b) reflected ray
   (c) normal
   (d) angle of incidence
   (e) angle of reflection



2. Calculate the values for the angles in the following diagrams:
(a) (b) (c) (d)



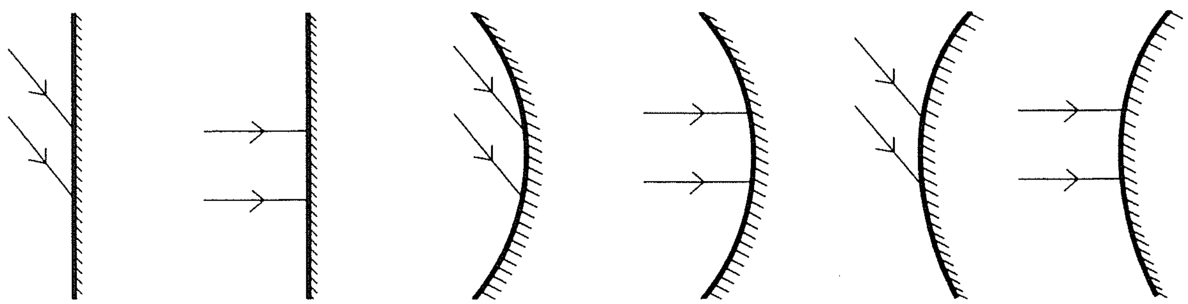
(a) angle r = ________

(b) angle s = ________
angle t = ________

(c) angle u = ________
angle v = ________

(d) angle w = ________

3. Draw in the reflected rays for each of the following:



(a)(i) (a)(ii) (b)(i) (b)(ii) (c)(i) (c)(ii)

Name the types of mirrors (a) ____________ (b) ____________ (c) ____________

Research
Use books to find out how a periscope works. Build one!

Mirror magic

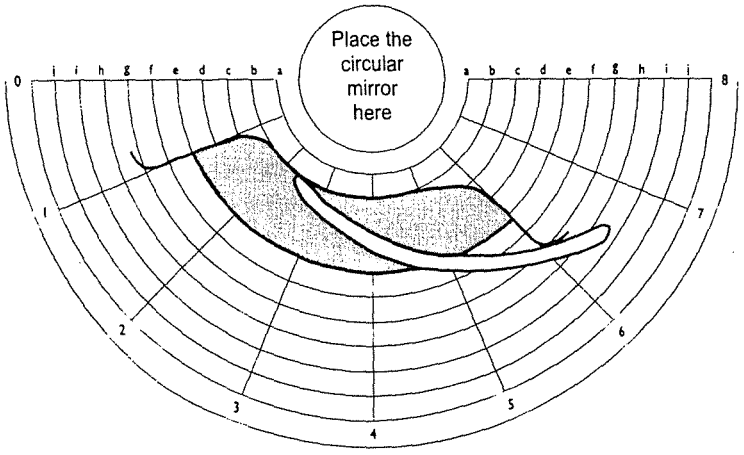
You will need thick unpatterned aluminiu
The cylinder should be 10 cm high a
cylinder acts as a circular mirr
foil shinier and to facilitat

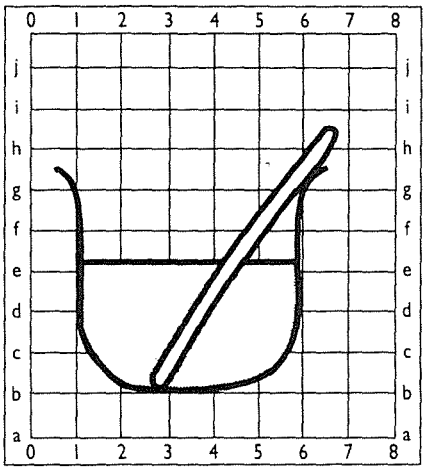
4. Looking

Mirror magic

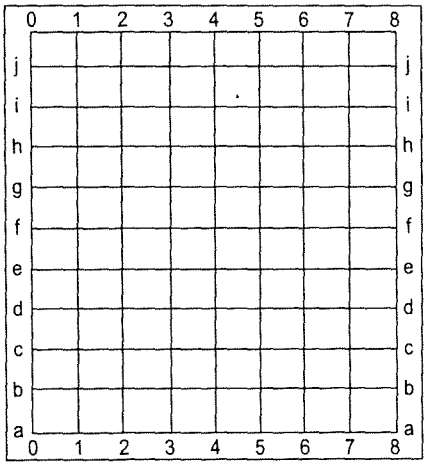
You will need thick unpatterned aluminium foil or metallic cardboard to investigate mirror magic. The cylinder should be 10 cm high and 12 cm wide, including several centimetres for overlap. Your cylinder acts as a circular mirror. Hint: Rub a ruler across the back of aluminium foil to make the foil shinier and to facilitate rolling.

A. Looking into a circular mirror. Adjust the diameter of the circular mirror to fit the particular circle below. View the diagram in the mirror.



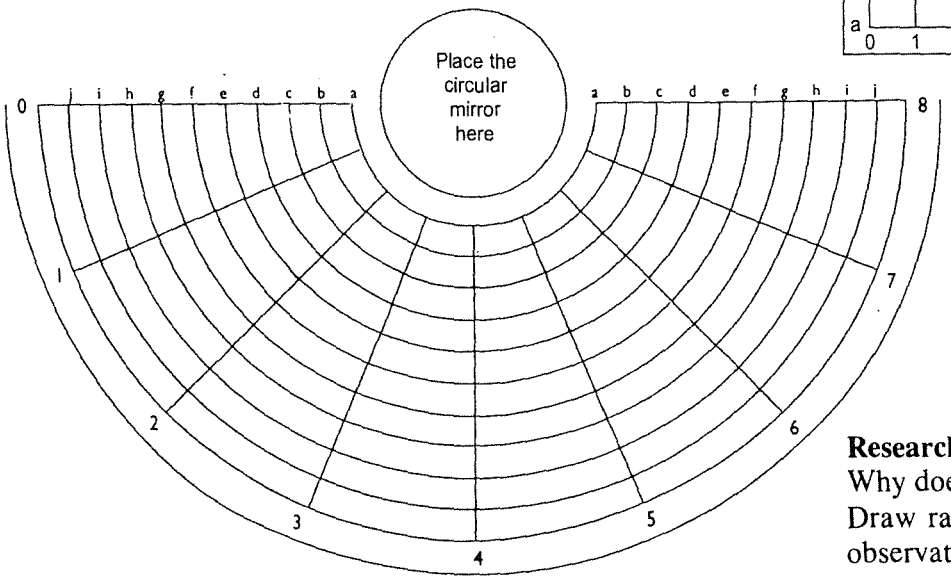


B. Making a distorted picture. You too can draw a distorted picture that will be corrected in the circular reflective surface.



Method:

1. Find a suitably sized simple picture or diagram.
2. Draw a grid over the picture.
3. Label the horizontal and vertical lines on the grid.
4. Transfer points from this grid to the new circular grid that has been labelled in the same way.
5. Join up the points, checking them using your mirror.

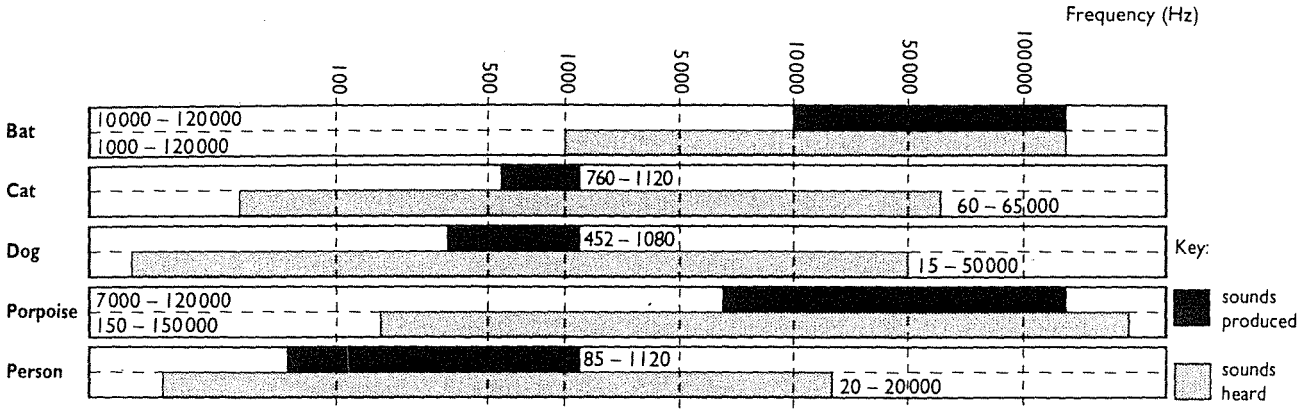


Research

Why does the circular mirror work? Draw ray diagrams to explain your observations.

Someone's listening

The diagram shows the ranges over which sounds can be produced and heard by five different life forms. Use the diagram to answer the following questions:



1. Can people hear sounds emitted by (a) bats and (b) porpoises? Answer fully.

2. If you needed to design an alarm that could be heard by porpoises and not by people, what frequencies could you use?

3. A gardener wants to use high-frequency sound to keep dogs and cats off her garden. What frequency could she use, so that people would not be able to hear the sound?

4. Which life form/s in the diagram:
   (a) produce sound having
      (i) the highest frequency? _____
      (ii) the lowest frequency? _____
   (b) hear sounds having
      (i) the highest frequency? _____
      (ii) the lowest frequency? _____

5. Would a person whose hearing was limited to the range 50–10 000 Hz have difficulty hearing other people talk? Why/why not?

6. A stereo system produces sounds in the 15–30 000 Hz range. Which life form/s in the diagram could hear the entire range?

Research

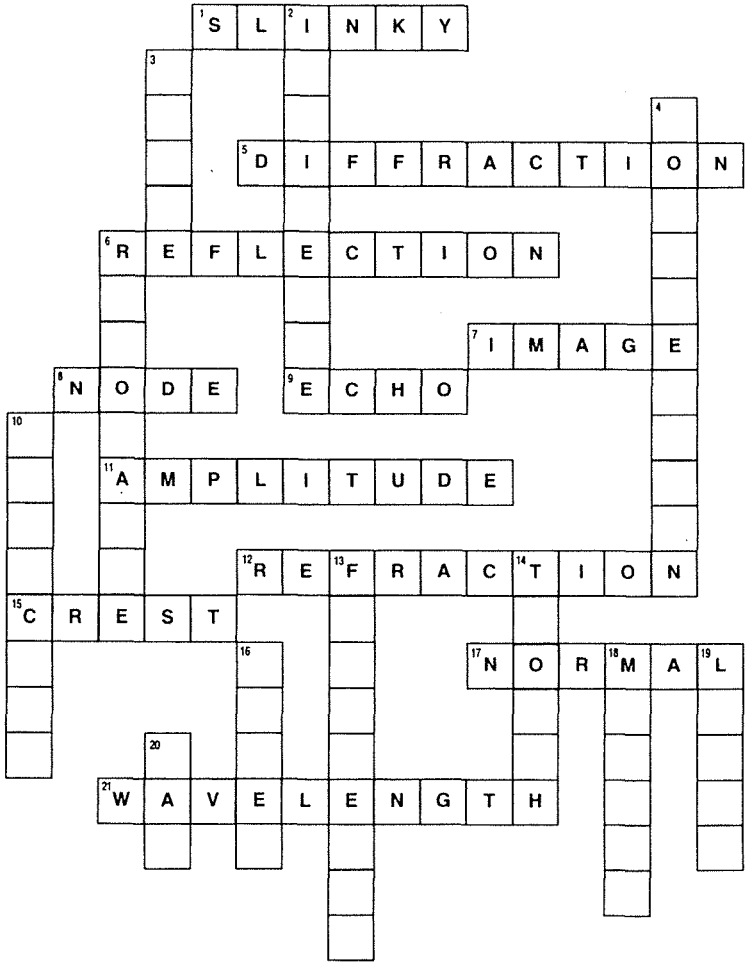
Find out:

(a) the hearing range of at least 4 other animals

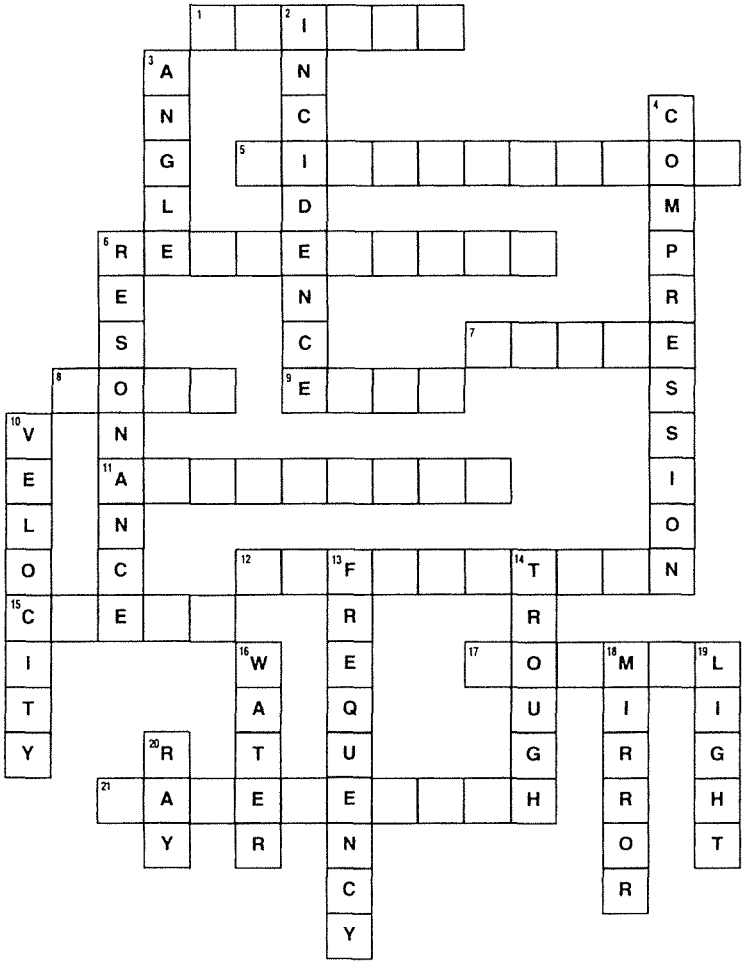
(b) the range of sounds produced by at least 4 musical instruments. (Physics textbooks might help.)

Barrier crossword: Waves

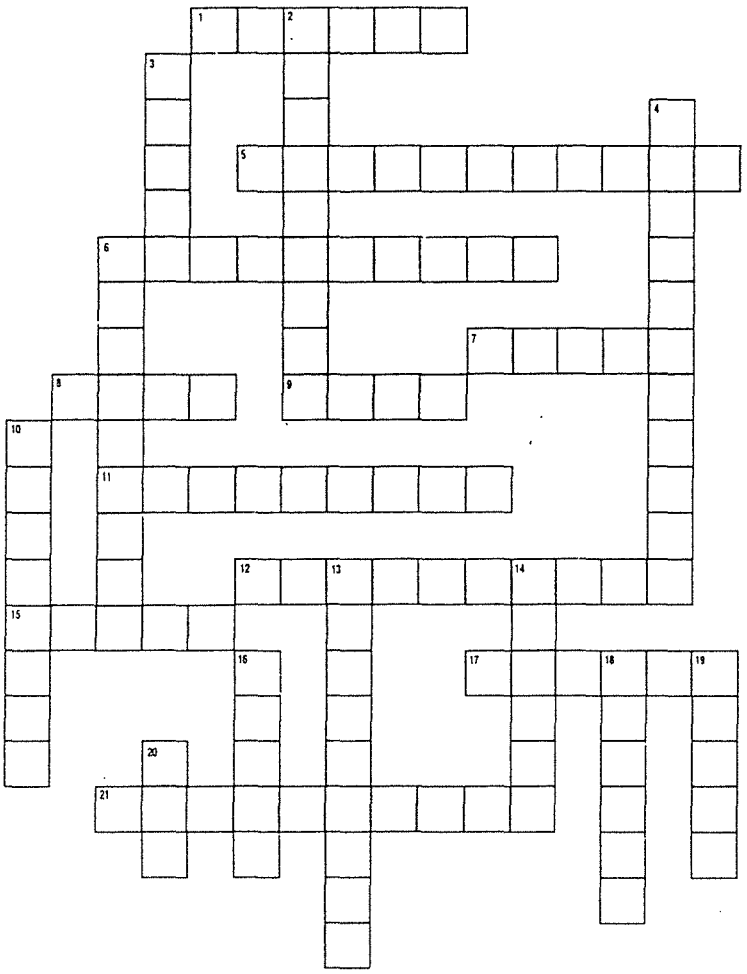
Across words



Down words



Traditional crossword: Waves



Clues

Across

1. Type of long thin spring
5. Waves bending around objects
6. Seen in a mirror
7. Also seen in a mirror
8. Place of no movement on a standing wave
9. Reflection of a sound wave causes this
11. Height of a wave above its rest position
12. Bending of light as it moves from one medium to another
15. The uppermost part of a wave
17. Perpendicular line drawn from a reflecting surface
21. Length of a wave

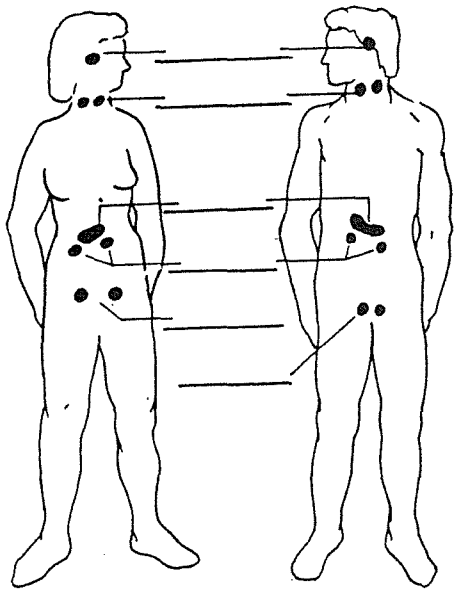
Down

2. This angle equals the angle of reflection
3. Light waves hit a surface an
4. Sound is this type of wave
6. One vibration sets off another vibration
10. Speed including direction
13. Measured in hertz
14. The lowest part of a wave
16. Boats use this type of wave
18. Object used for seeing reflections
19. An electromagnetic wave
20. A thin beam of light

Body chemistry

The following table provides information about some of the glands and the chemicals or hormones these glands produce.

Gland	*Some of the functions of hormones produced*
Pituitary (sometimes called master gland)	• cell growth • onset of puberty
Thyroid	hormone thyroxin controls: • growth • use of oxygen
Pancreas	hormone insulin controls: • blood sugar levels
Adrenal glands	hormone adrenalin controls: • 'fight or flight' reactions
Ovaries (female)	hormones control: • menstrual cycle • female sexual characteristics
Testes	hormones control: • male sexual characteristics



Use the table and diagram to answer the following questions.

Questions

1. Diabetes is a disorder caused by an imbalance in insulin in the body. Where is insulin produced?

2. Which glands are responsible for:
   (a) the development of female and male characteristics?
   (b) the onset of puberty?
   (c) controlling growth?
   (d) fast heartbeat during times of fright?

3. Label the diagram of the endocrine system.

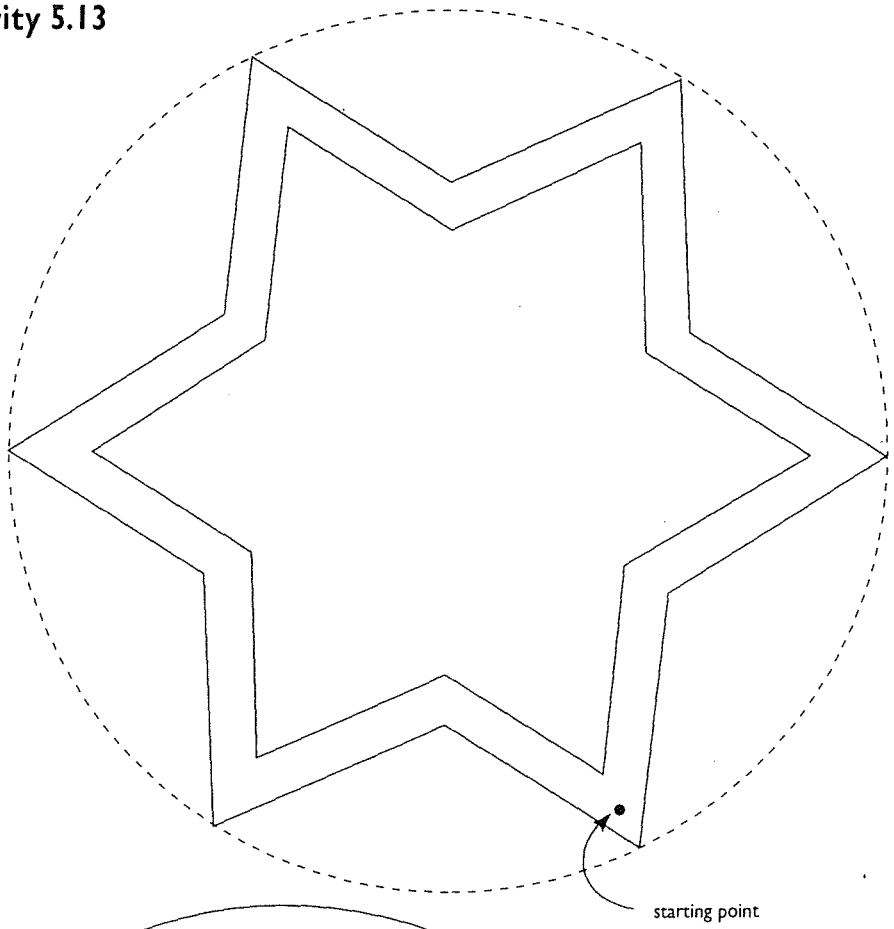
4. Disorders occur when glands do not function correctly. What do you think may occur if the following glands malfunction?
   (a) The thyroid gland produces too much thyroxin.
   (b) The pituitary gland produces hormones to mark the onset of puberty when a human is 8 years of age.

5. Use library books or biology textbooks to research the hormones produced by the parathyroid and by the thymus.

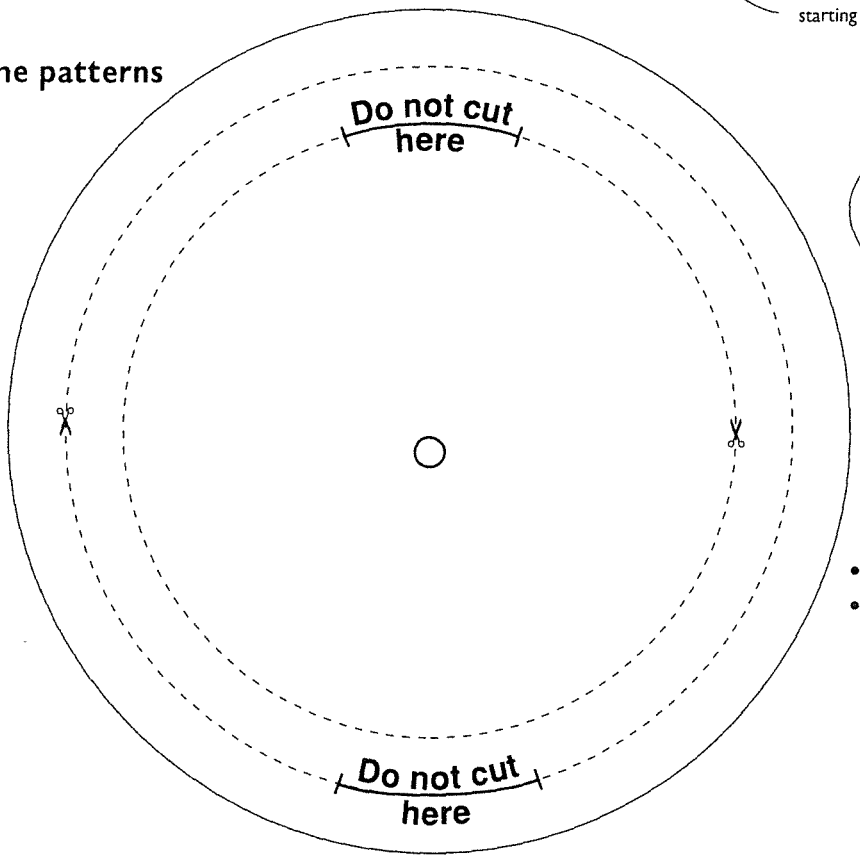
6. Either make a find-a-word or a crossword using words from the table.

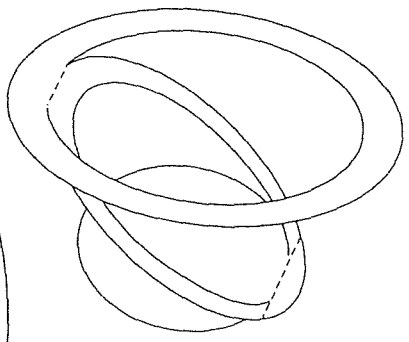
Is seeing believing?: Part A

Star for Activity 5.13



Some patterns



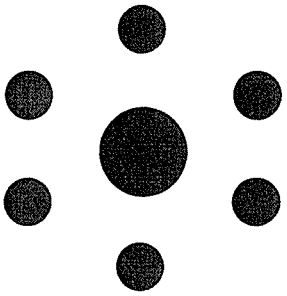


- Fold as shown.
- Place on a rotating turntable, and 'watch it wobble'.

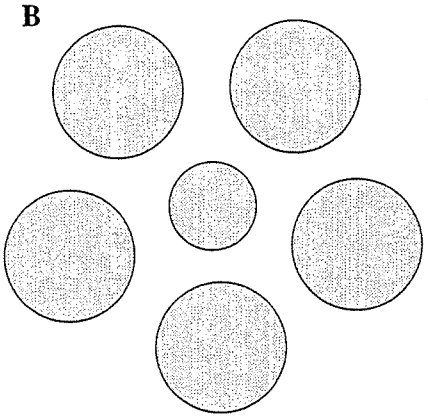
Is seeing believing?: Part B

Research:
Find illusions in books about human perception and optical effects. Here are some illusions to get you started.

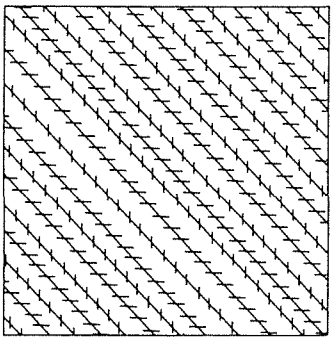
A



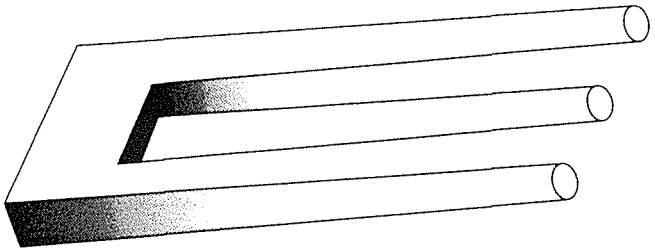
B



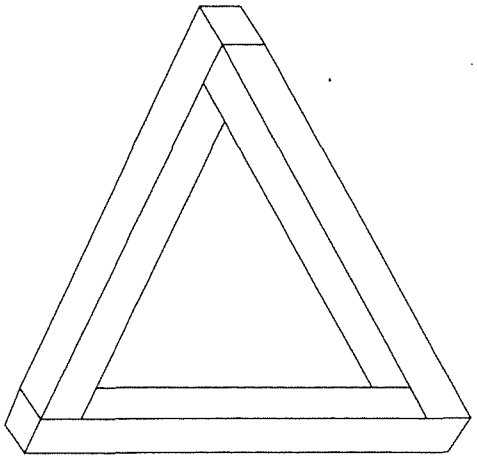
Which circle is larger—the one in the middle of A or the middle of B? Measure it to find out.



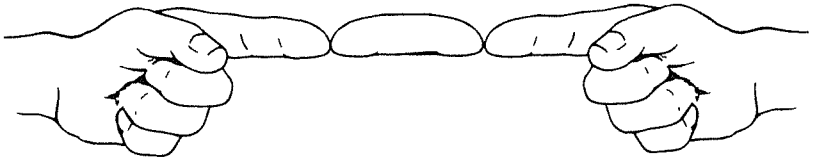
Look closely. This pattern is drawn with all parallel lines. Draw one for yourself in your notebook.



Where is the inside or the outside of these shapes?



Something for you to try: Floating finger



Hold your hands about 30 cm from your eyes, with fingertips touching. Now look at a distant object, behind your fingers. You should be able to see an 'extra' piece of finger.

Signing: A quiet activity

Fingerspelt alphabet

You will need to work with a partner to complete this sheet.

1. Use the fingerspelt alphabet to sign:
   (a) your name
   (b) your town, city and country
   (c) a message to your friend
   (d) the name of your favourite
      (i) TV show
      (ii) sporting hero
      (iii) personality

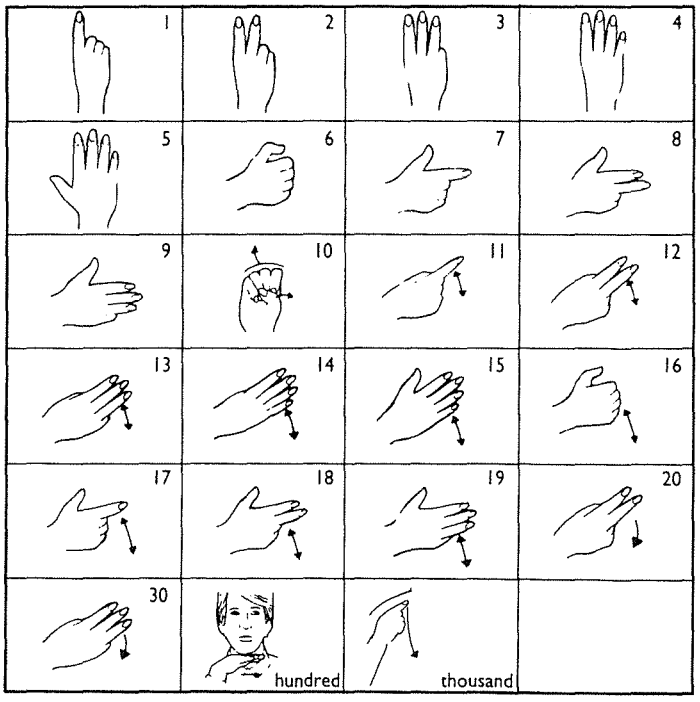
Reproduced from the *Dictionary of Australasian Signs*, with permission from the publisher, the Victorian School for Deaf Children Inc.

Numbers in signs

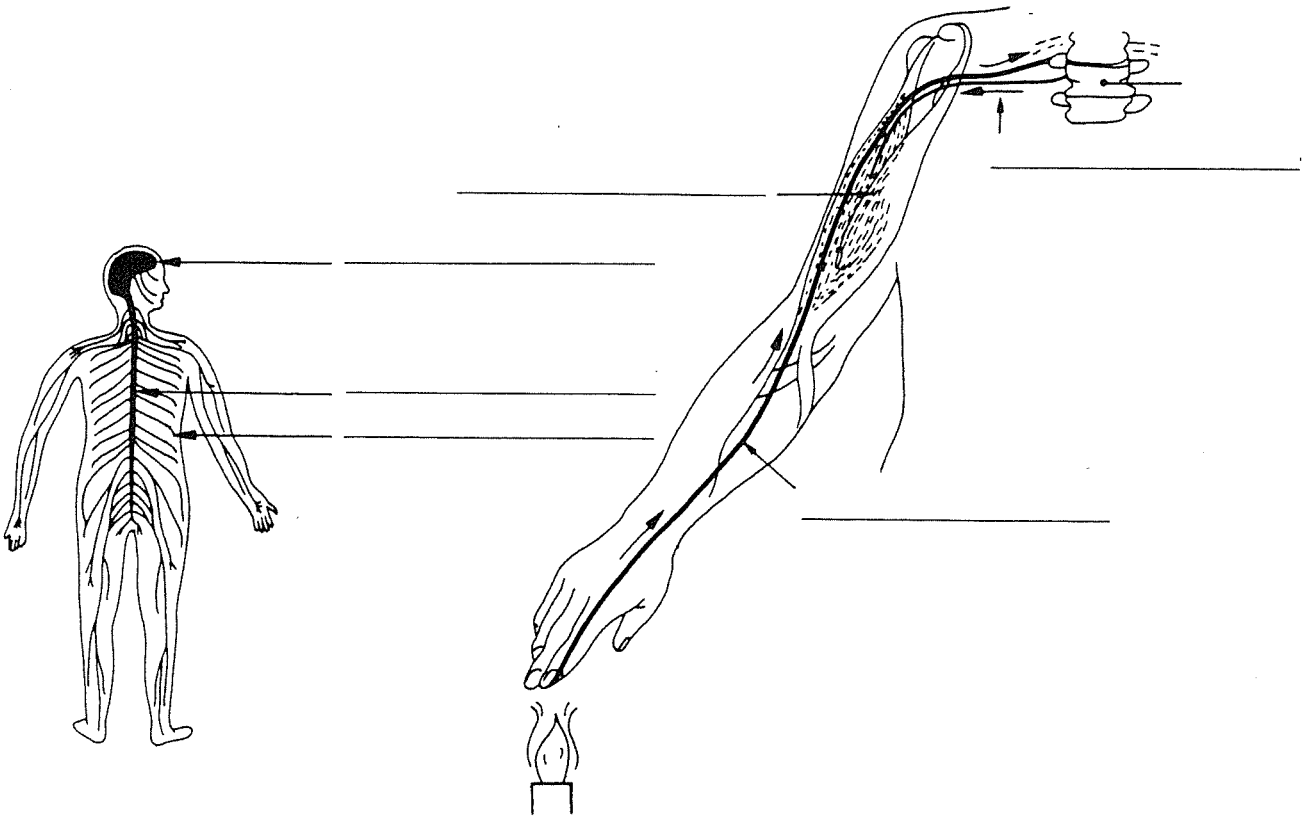
Before using numbers in signs, here are a few examples:
To sign 23—sign *20*, then sign *3*.
To sign 405—sign *4*, sign *hundred*, sign *and*, sign *5*.
To sign 8352—sign *8*, sign *thousand*, sign *3*, sign *hundred*, sign *and*, sign *50*, sign *2*.

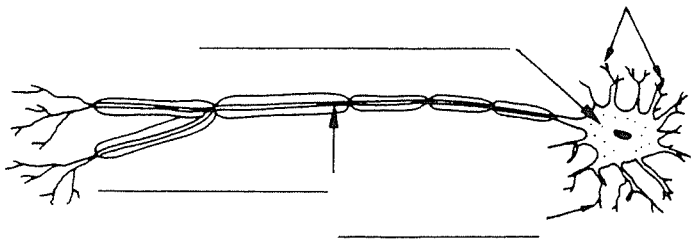
2. Sign your:
   (a) age
   (b) house number
   (c) postcode
   (d) telephone number

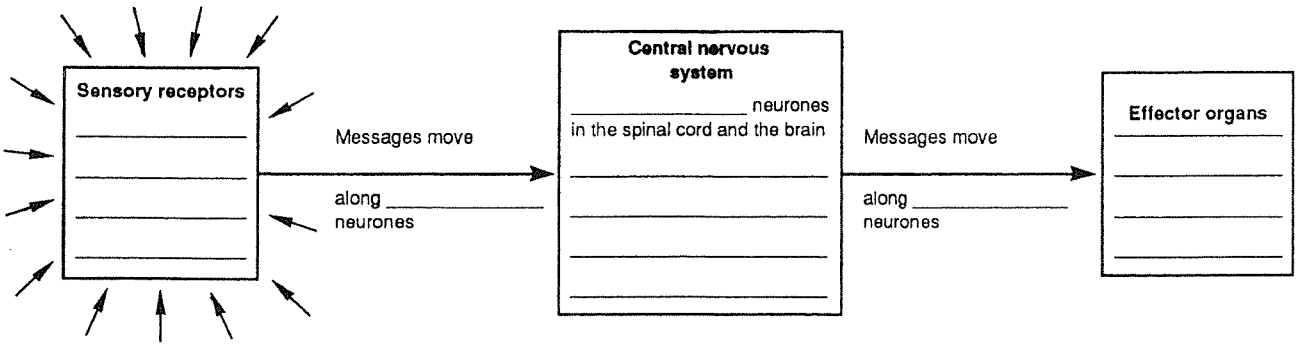
Challenge: Learn the fingerspelt alphabet and the numbers in signs, and see if you can spend, say, all of recess, using only sign language.



Useful diagrams



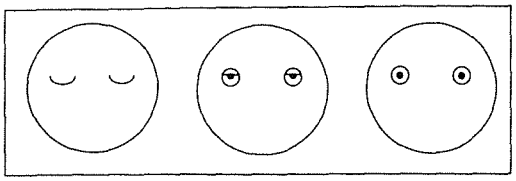




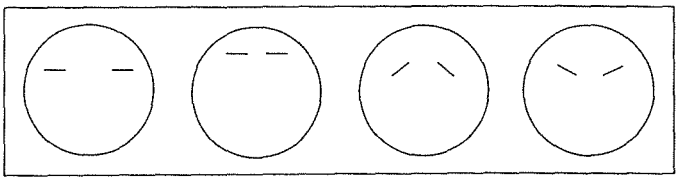
Unspoken language

1. Use the facial features to draw expressions of the emotions listed in the boxes.

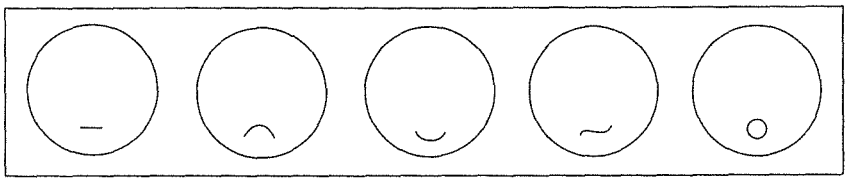
Eyes



Eyebrows



Mouths



Happiness **Sadness** **Fear** **Shame**

Boredom **Anger** **Surprise** **Excitement**

Body language

2. What might the following examples of body language communicate? A person with:
   (a) one hand on hip, shaking a finger toward someone

   (b) arms folded and head turned away from a companion

   (c) both hands raised in the air after a race

   (d) drooped shoulders and head hung down

   (e) complete attention being focused on a companion

   (f) open arms outstretched toward a small child

Activity

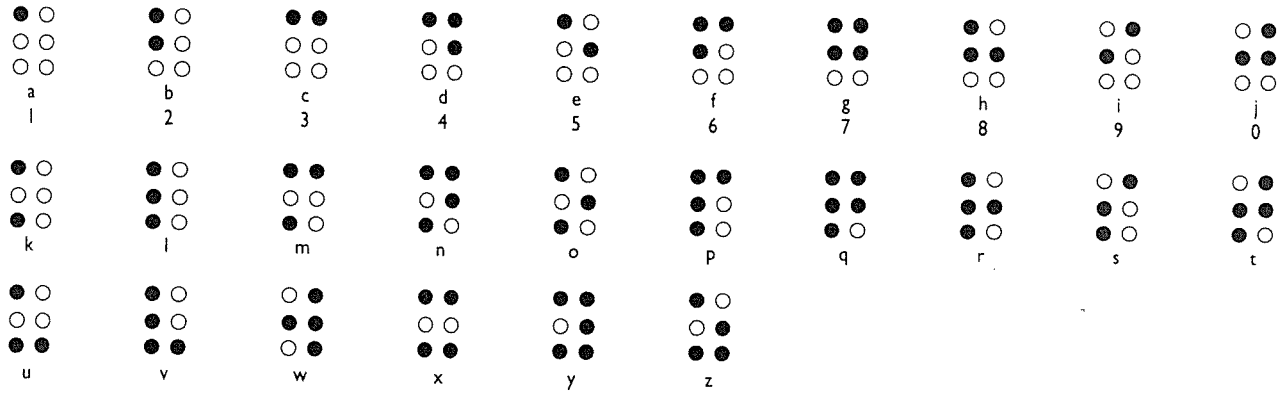
Three students go outside, while the remainder of the class decides on a simple mime.
The students then return.
A student mimes the activity for student 1.
Student 1 then mimes it for student 2.
Student 2 then mimes it for student 3.
Student 3 must then describe what student 2 is actually miming.
Examples of suitable mimes include making a cake and mowing a lawn.

Braille alphabet and strips

Braille alphabet

1 ○ ○ 4
2 ○ ○ 5
3 ○ ○ 6

The Braille cell is two dots wide and three dots deep.
Note: These cells are larger than real Braille cells.

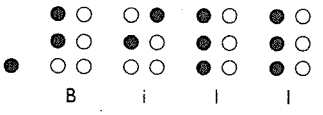


Capital letters

○ ○
○ ○
○ ●

The capital sign • goes straight *before* the letter to be made a capital.

e.g. Bill



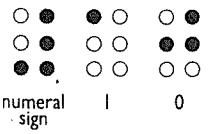
Numbers

○ ●
○ ●
● ●

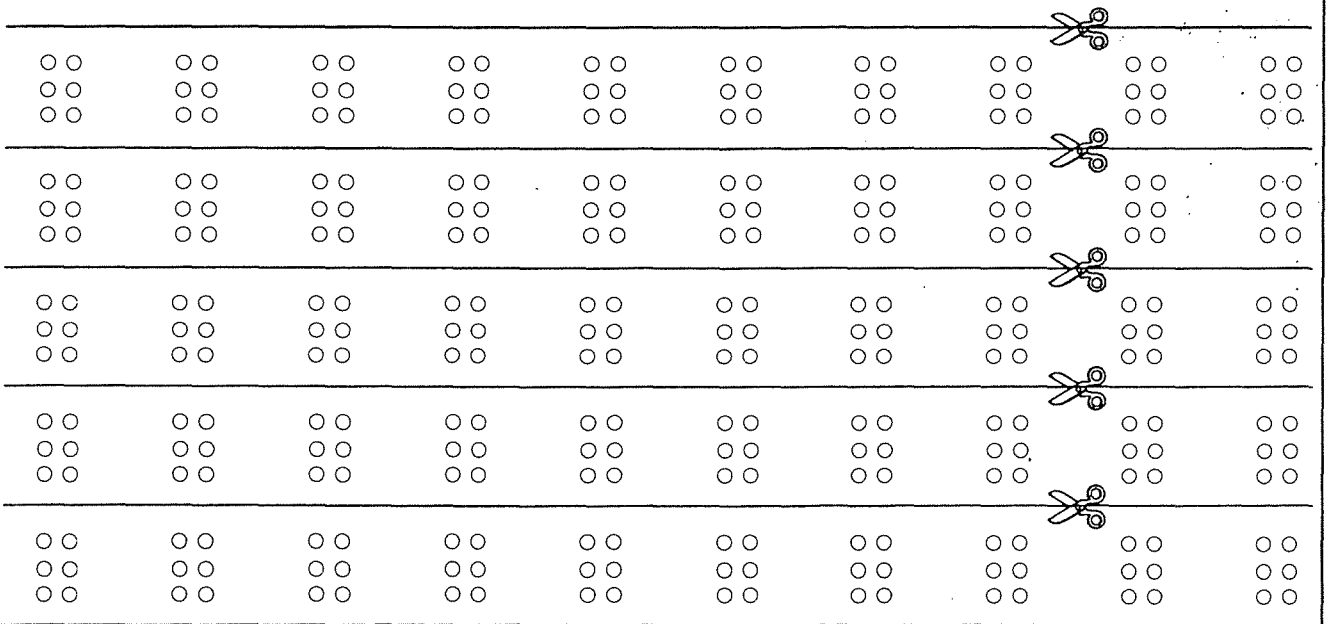
The numeral sign goes *before* the letters:

a b c d e f g h i j
Which correspond to: 1 2 3 4 5 6 7 8 9 0

e.g. 10



Use your textbook, together with the information and strips on this sheet, to 'write' the following in Braille:
(a) your name (b) address (c) your best friend (d) your favourite television program
(e) your favourite singer or group
Get a friend to check your Braille.

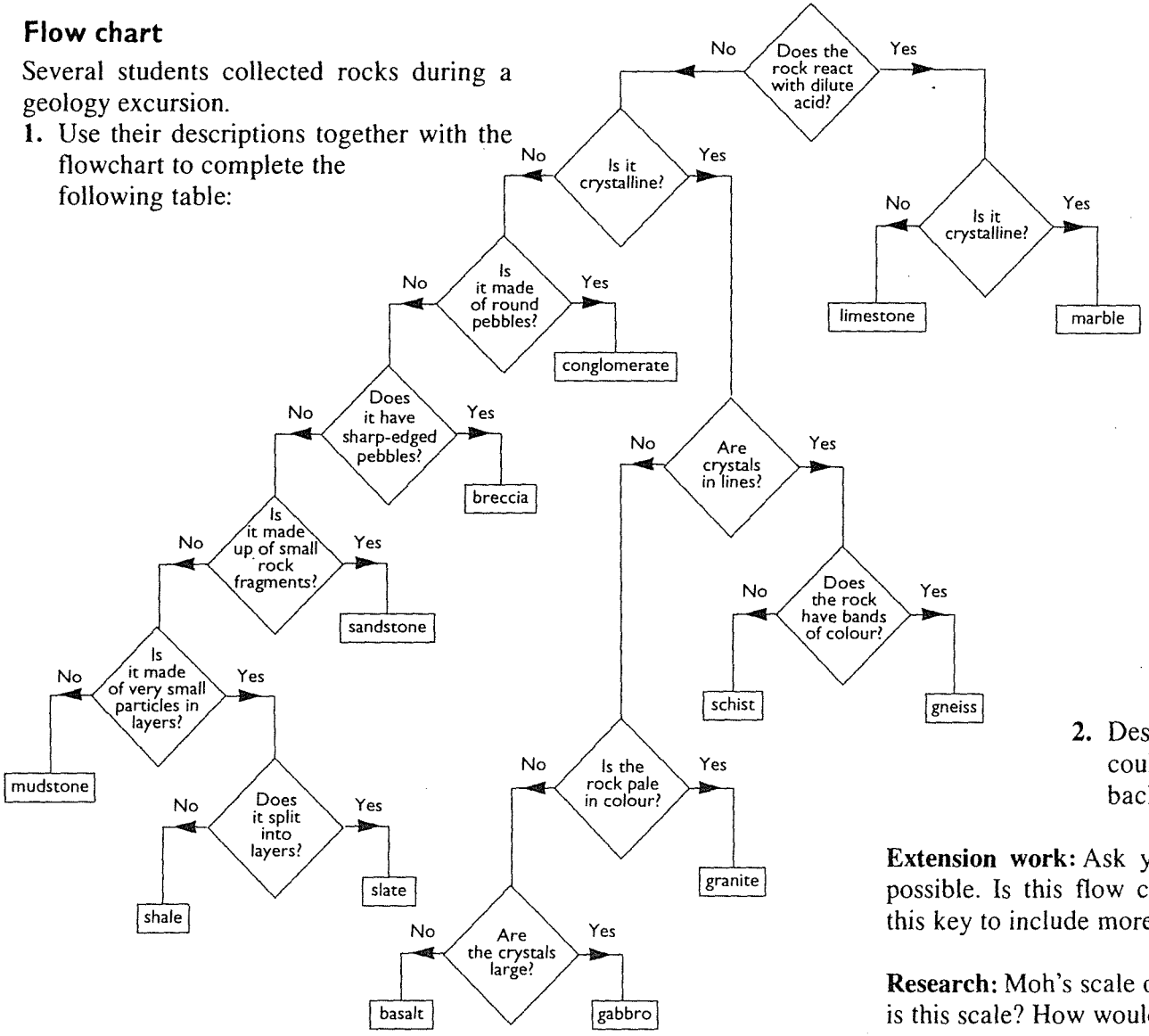


A simplified key for identifying some common rocks

Flow chart

Several students collected rocks during a geology excursion.

1. Use their descriptions together with the flowchart to complete the following table:



Person who collected the rock	*Description*	*Identity of rock*
Sam	• pale colour • crystals (not in lines)	_____
Judy	• small fragments • yellow colour • no sharp-edged pebbles	_____
Louise	• large round pebbles	_____
Michael	• crystals • reacts with acid	_____
Flavia	• rocks in coloured bands • crystals in lines	_____
Con	• no reaction with acid • large crystals (not in lines) • dark colour	_____

2. Describe the types of observations and/or tests that could help you to identify an unknown rock. Use the back of this sheet for your answer.

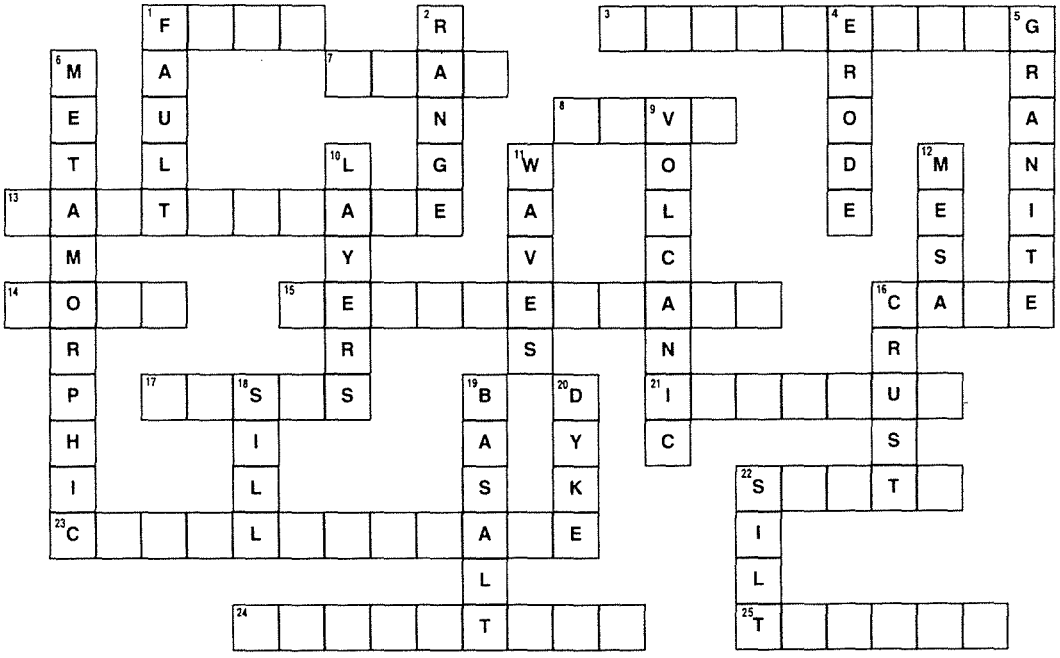
Extension work: Ask your teacher to view as many rock samples as possible. Is this flow chart accurate? Can you improve and/or extend this key to include more rocks?

Research: Moh's scale of hardness is used to help to identify rocks. What is this scale? How would you use it?

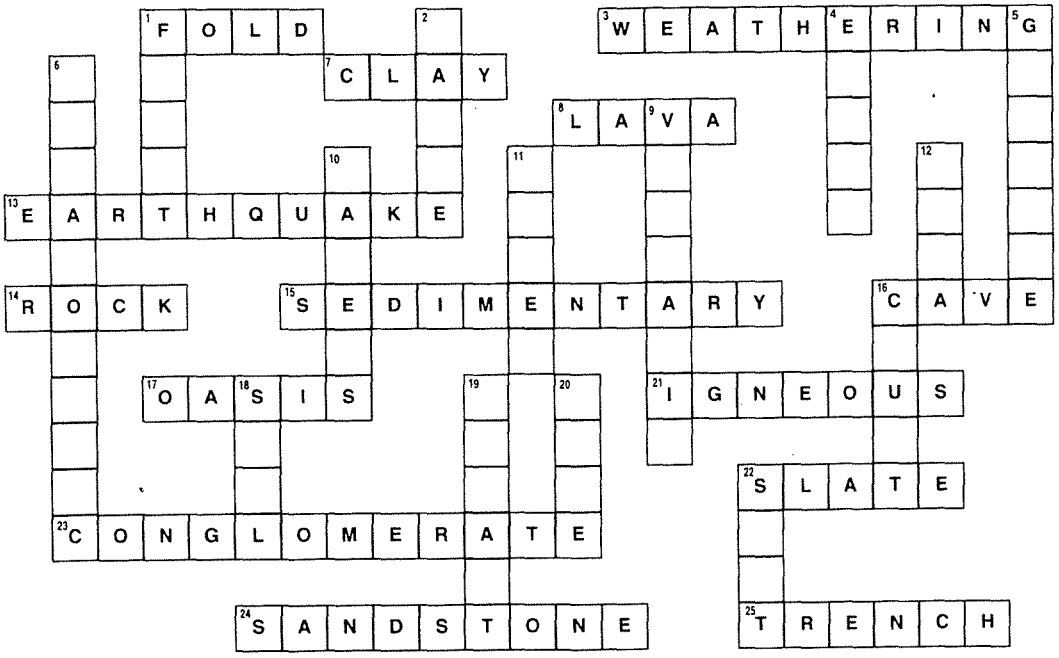
BLM 34

Barrier crossword: Changes in the Earth's crust

Down words

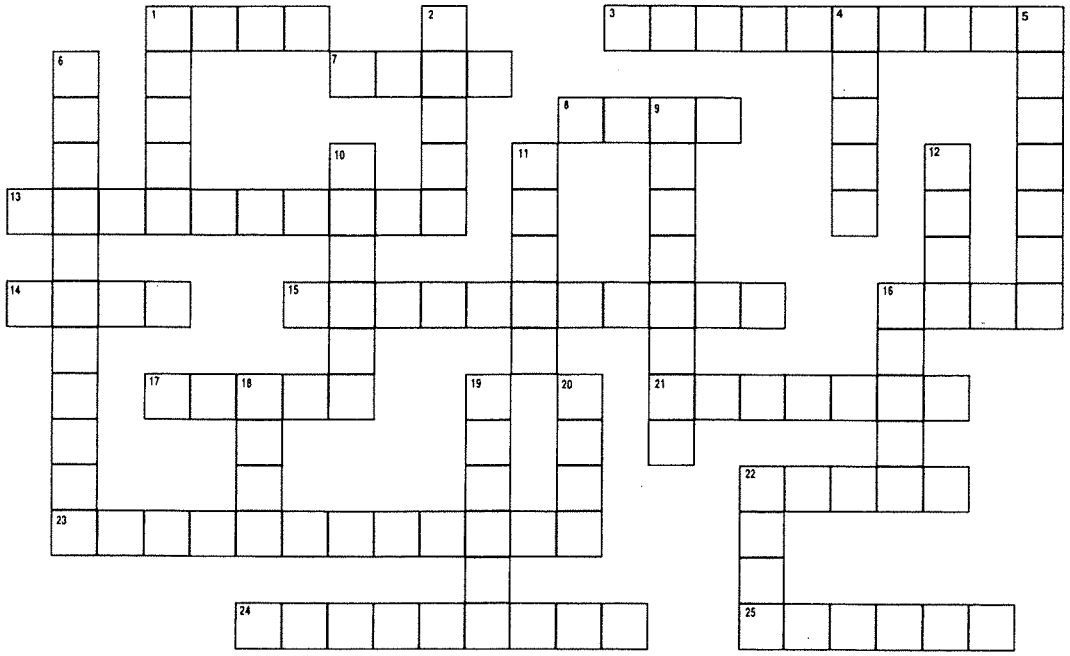


Across words



BLM 35a

Traditional crossword: Changes in the Earth's crust



Clues

Across

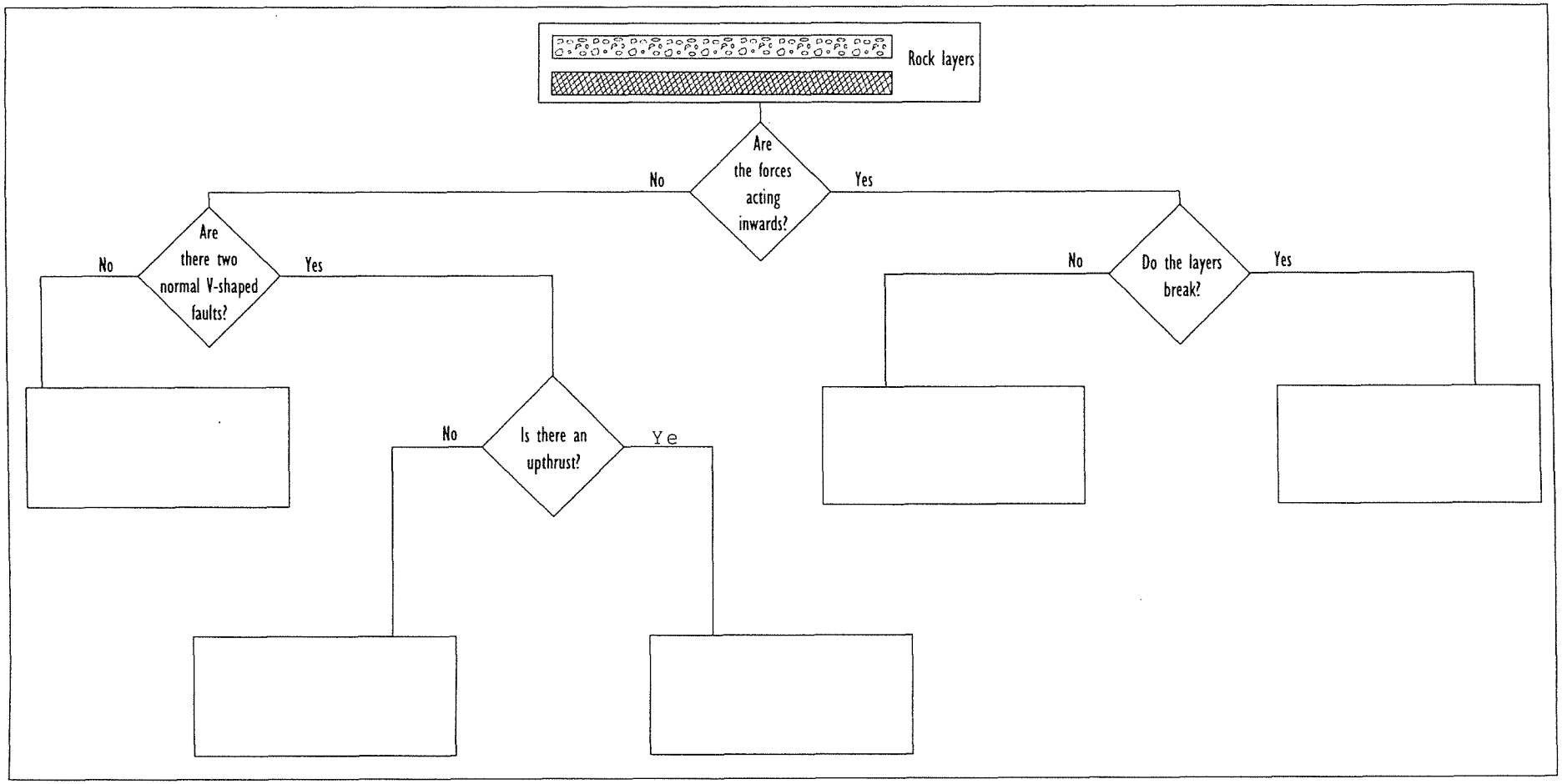
1. A syncline is an example
3. Breaking down of rocks
7. Fine-grained slippery material used to make bricks
8. Material that flows from volcanoes
13. Shaking of the Earth
14. Compacted mineral and soil material
15. Type of rock formed from weathered material
16. Stalagtites are found here
17. Place in a desert where water may be found
21. Rock formed from molten material
22. Shale may change into this
23. Rock containing visible pebbles
24. Rock formed from substance found on the beach
25. Deep area under the ocean

Down

1. A movement along a joint may cause this
2. Many mountains together
4. To carry weathered material away
5. A plutonic igneous rock
6. Type of rock formed when heat and pressure cause change
9. Coming from a volcano
10. Sedimentary rocks are found in...
11. P, S, and L are types of these
12. A desert formation
16. Uppermost layer of the Earth
18. Horizontal intrusion
19. An igneous rock sometimes called bluestone
20. Another intrusion
22. Fine sediment that may block rivers and bays

Rock layer formations (Exercise 6.3)

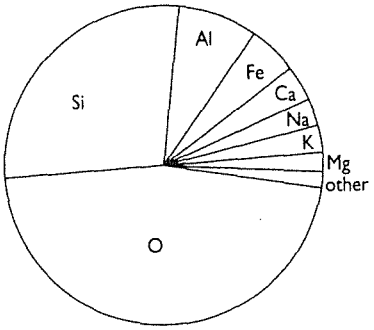
1. Draw and label the missing diagrams to show the resultant folds or faults.



2. Write at least two sentences about each of the 6 folds/faults. Remember to describe the fold/fault, and to explain how it formed.

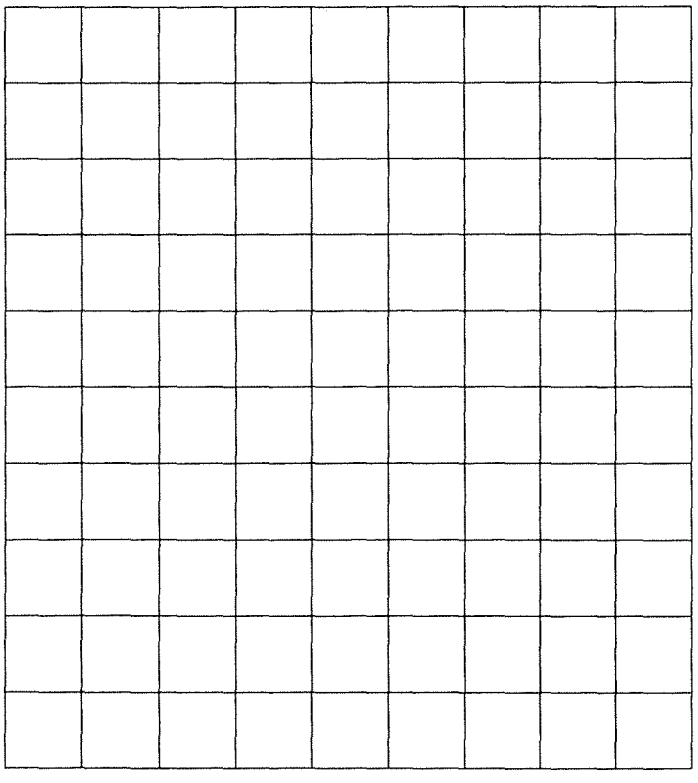
Chemical elements in the Earth's crust

The pie chart shows the percentage of elements in the Earth's crust.



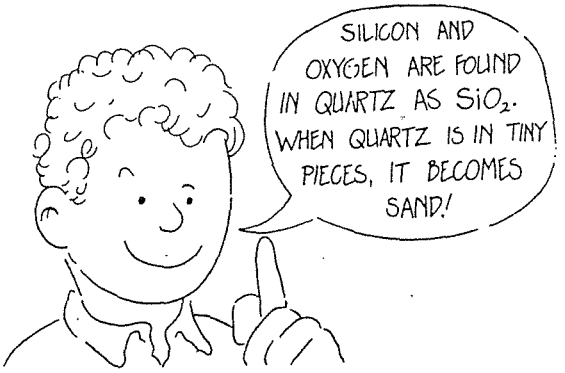
Non-metals	oxygen	O	46.6%
	silicon	Si	27.7%
Metals	aluminium	Al	8.1%
	iron	Fe	5.0%
	calcium	Ca	3.6%
	sodium	Na	2.8%
	potassium	K	2.6%
	magnesium	Mg	2.1%
All of the other 84 naturally occurring elements			1.5%

1. On the axes plot this information as a histogram.



2. On the bar, plot the same information.

3. What percentage of the elements in the Earth's crust do silicon and oxygen account for together?



Read the following information and answer question 4.

The Earth's crust is mainly black, grey, brown, dark red or dull yellow in colour. Black and grey soils often have carbon present, while brown, dark red and yellow soils owe their colour to the presence of iron compounds.

The pie chart showed that only 8 chemical elements make up 98.5% of the crust. Since the other metals form compounds that are mainly white and colourless, iron compounds are responsible for our colourful Earth.

4. (a) What substance usually causes soil to have the colour
(i) grey? _____ (ii) red? _____
(b) How many elements make up 98.5% of the Earth's crust?

(c) Which element colours our soils?

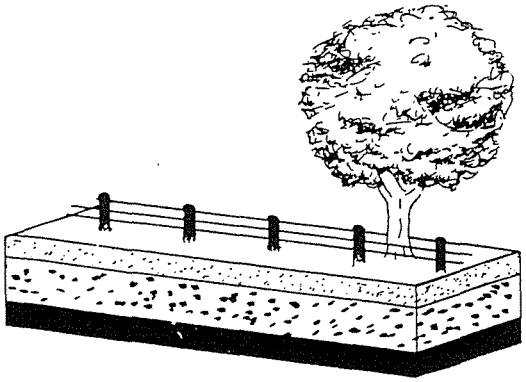
Research

(a) Find out which metallic elements are present in haematite, sphalerite, malachite and galena.
(b) Are any ores found in your local area? If so, name them. Try to find out their chemical composition.

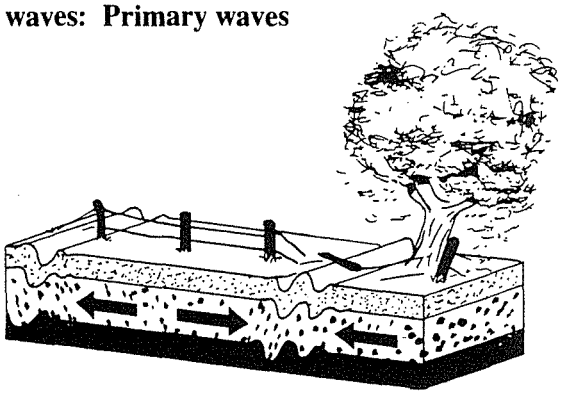
A closer look at earthquake waves

What happens

Before an earthquake

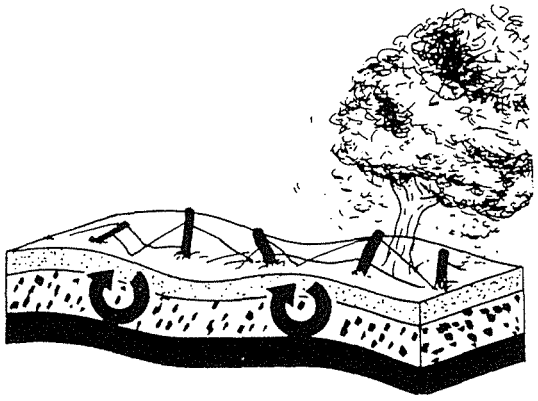


P waves: Primary waves



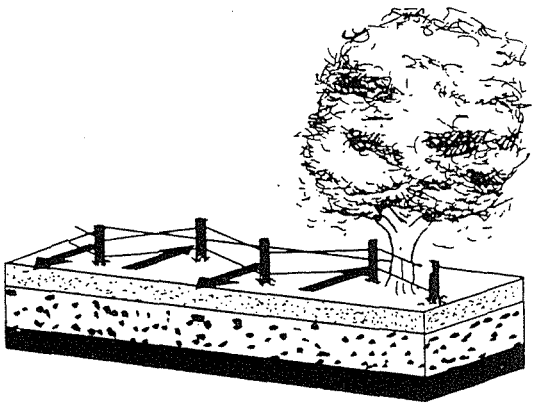
P-waves (compression or primary waves) are:
- first waves to be monitored by earthquake centres
- travel between 5.5 and 13.5 km/s
- travel through solids *and* liquids

S waves: Secondary waves



S -waves (transverse or secondary waves):
- travel between 3.2 and 7 km/s
- travel only through solids

L waves: Surface waves



L-waves (longitudinal waves)
- travel at 3.2 km/s
- travel over the Earth's surface

Questions

1. In your notebook or on the back of this sheet, draw up a table to show information about earthquake waves. Include the name and type of wave, speed of travel, and so on.

2. Which waves (a) travel fastest? _____

   (b) are recorded on a seismograph (i) first _____ (ii) last? _____

Research

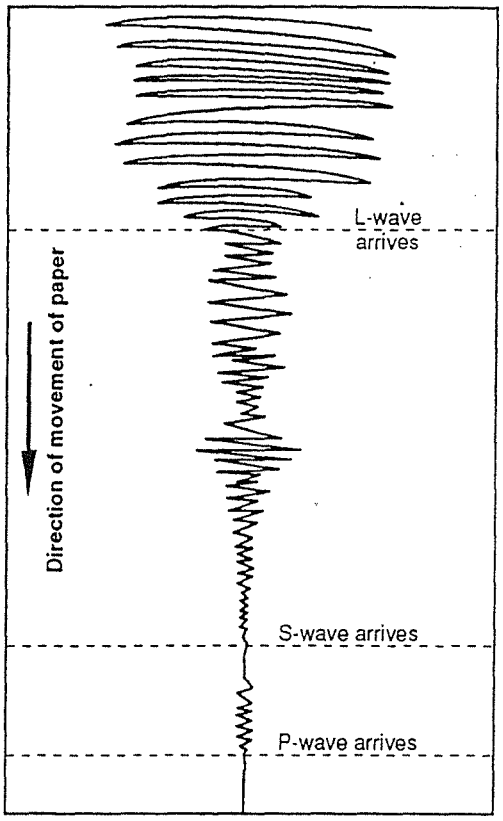
Find out about a recent earthquake.

(Continued)

Looking at seismograms

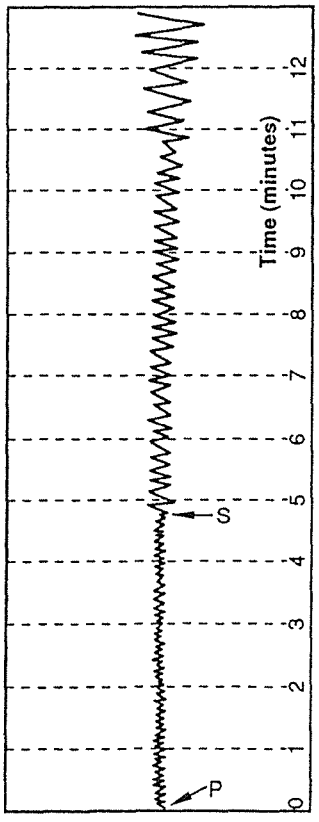
Seismologists use seismograms to determine how far away the earthquake occurred.

A seismogram



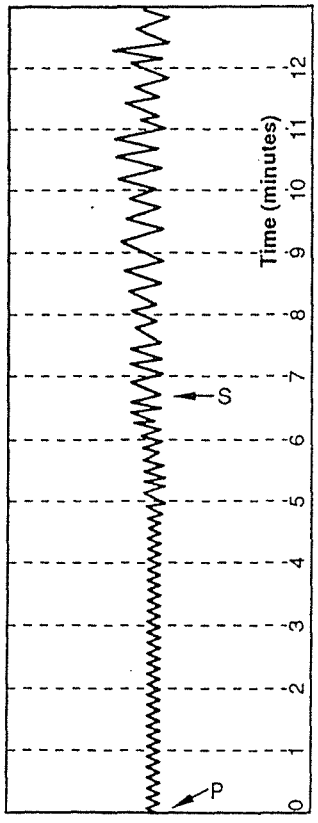
Question

How far away from the recording stations did the earthquakes below occur? Use table on page 262 from *Dynamic Science Book 3* to work it out.



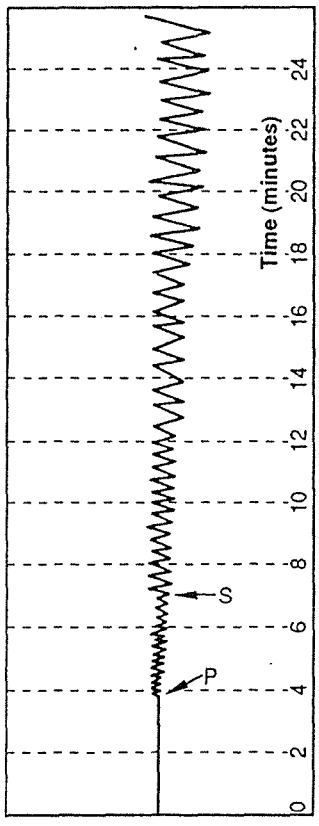
Time of arrival of S 4.7 min
Time of arrival of P 0
Difference 4.7 min
Approx. distance 3250 km

(a)



Time of arrival of S _____
Time of arrival of P _____
Difference _____
Approx. distance _____

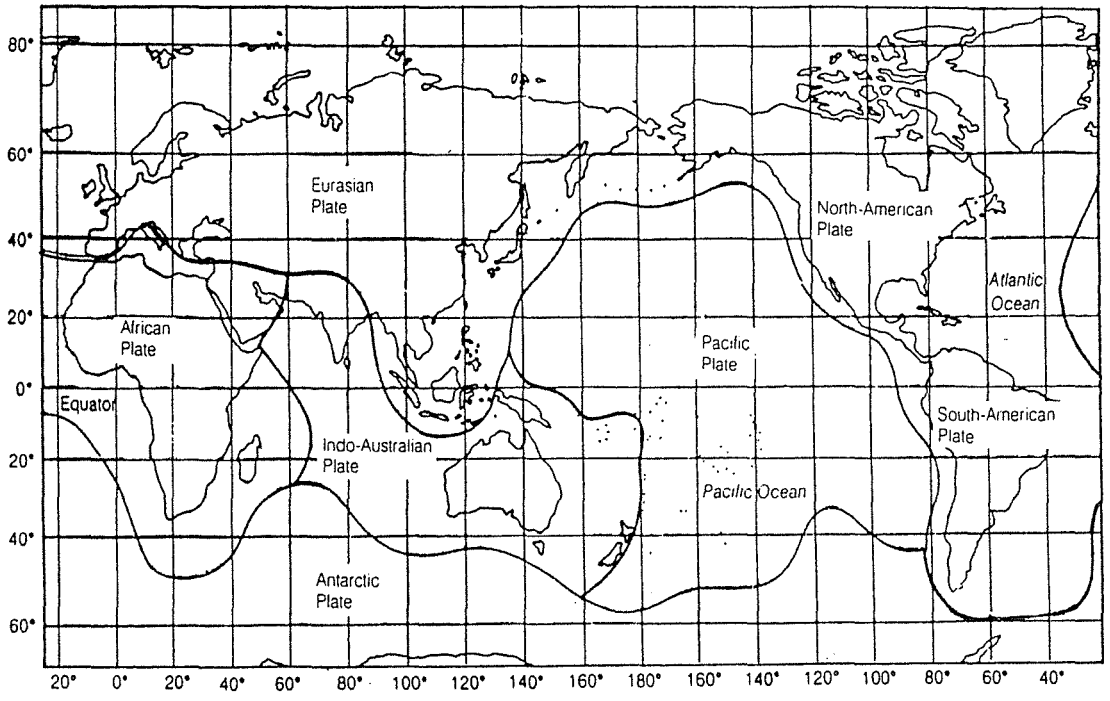
(b)



Time of arrival of S _____
Time of arrival of P _____
Difference _____
Approx. distance _____

The active Earth

1. The diagram shows the major plates that form the Earth's surface. On this diagram you are going to plot positions of some volcanoes and recent earthquakes.



A. Volcano positions

1. Mt Pinatubo	15°N	120°E
2. Mt Fuji	35°N	138°E
3. Mt Etna	37.5°N	15°E
4. Mt Kilauea	20°N	155°W
5. Baru' Volca'n	9°N	82°W
6. Canlaon Volcano	10°N	123°E
7. Cotopaxi	0°	78°W

B. Earthquake positions

Lat	*Long*	*Lat*	*Long*	*Lat*	*Long*
1. 20°N	40°E	2. 40°N	120°W	3. 35°N	135°W
4. 15°N	43°E	5. 43°S	170°E	6. 60°N	152°W
7. 0°	140°E	8. 5°S	110°E	9. 0°	80°W
10. 40°N	20°E	11. 30°N	53°E	12. 52°N	160°E
13. 27°N	120°W	14. 18°S	166°E	15. 20°S	70°W

2. Is there any relationship between the edges of the plates and the occurrence of volcanoes and earthquakes?

Research

What is the Ring of fire? Where is it?

Work stations: Rocks and rock formations

This unit should take about 3 weeks to complete. You are responsible for organising your time so that all work for these stations is completed within the 3 weeks. You will need to work quickly and efficiently. You will need to clean up after each activity and replace everything that you have used.

Station 1: Rocks

At this station, you will review rock types that you learnt about in Book 1. You will also review how the rocks provide clues about the history of an area. (You have already done some of this work in Book 2.) You will be working from your textbook, as well as looking at some rocks.

Station 2: Weathering

This station involves different types of weathering and the agents of erosion. You will be working from your textbook and carrying out activities to investigate weathering. (If you have time you will look at a particular landscape.)

Station 3: Save our soil!

This station looks at erosion, a desert landscape and erosion problems caused by human activity. You will consider possible solutions to these problems. You will be working from your textbook.

Station 4: Mud pies and all that stuff

This station involves making models—models of sedimentary rocks and models of rock layers. Remember to read all instructions thoroughly!

Work station cards: Rocks and rock formations

Station 1: Rocks

1. Read and summarise the sections: (i) Sedimentary rocks; (ii) Igneous rocks; and (iii) Metamorphic rocks. (Answer questions 1–5 if you have not included answers to them in your summary.)
2. Complete Exercise 6.1: Different rock types.
3. Collect the rocks for Activity 6.1: Looking at rocks. Write up and carry out the activity.

If you have time:

- look around your local area for rocks;
- try to identify the rocks that you find;
- use reference books in the library to find out the geological history of your local area.

Station 2: Weathering

This work station involves considerable work, so be organised!

1. Read and summarise pages 238–9. Ensure that you have included answers to Questions 6–11.
2. Design your experiment for Activity 6.2: A freezing experience. Discuss the method with your teacher, and then write up and carry out the activity. Record results.
3. Read and summarise Weathering: chemical, remembering that answers to questions 12–13 must be included.
4. Write up and carry out Activity 6.3: Acid and limestone. Remember to take care when handling acid!
5. Continue summarising up to the heading of Erosion. (You will have included answers up to question 15.)

Station 3: Save our soil!

1. Read and summarise Erosion, A desert landscape, Deposition, Human activities and erosion sections, remembering to include answers to questions 16–20.
2. Investigate erosion and possible ways of controlling it by writing up and carrying out Activity 6.4.
3. Read Reducing erosion and answer question 21.
4. Do Exercise 6.2: Sandy Farm.
5. Read Problems and products of erosion and answer question 22.

If you have time: find out about measures taken in your local area to control erosion.

Station 4: Mud pies and all that stuff

This work station involves activities that could make a mess, if you are not careful. Remember that *no* plaster of Paris is to go in the sink!

1. Read Activity 6.5: Making sedimentary 'rocks'.
   - Check if your teacher wants you to make models of all 3 rocks.
   - Write up the activity.
   - Collect the ingredients and make your 'rock/s'.
   - Label your 'rocks'.
   - Complete writing up the activity.
2. Read Activity 6.6: How do sediments form layers of sedimentary rocks?
   - Write up the activity.
   - Carry out the activity.
   - Clean up thoroughly and return all ingredients.
3. Read the beginning of Internal influences affecting the Earth's surface.
4. Answer question 23.

Additional product: Bandaids

Some bandaids seem to stick securely for many hours, while others seem to fall off easily. Your task is to compare bandaids by carrying out a variety of tests using:

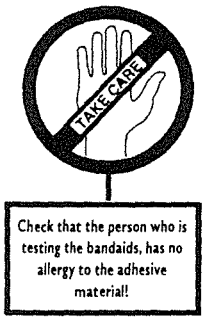
(a) the same brand of bandaid under different conditions, and

(b) different bandaids under similar conditions.

Question

1. Before carrying out any activities related to bandaids, survey your family and friends to find out which type/s of bandaids they prefer and the reasons for their choice.

Activity: Does it really stick?



Part A: Using the same brand of bandaid

Design an experiment to find the conditions under which a bandaid stays attached to skin longest. You will need to take care with your controls in this activity.

Part B: Using different brands of bandaids

Design an experiment to test which bandaids remain stuck for the longest time under the same conditions.

Activity: Looking at bandaids

What you need: # at least 3 different brands of bandaids with their packaging

What you do:

1. Record information from the packaging, including any guarantees, special features, price and so on.

Question

2. Use a dictionary to find out what the word 'guarantee' means.

2. Open the packaging. Comment on the ease with which the package can be opened.
3. Measure the length and width of both the bandaid and the padding section. Comment on any special features of the padding.
4. Repeat steps 1–3 for as many brands of bandaids as possible.
5. Construct a table to record all information about the bandaids studied.

Results

Your table

Draw a histogram showing the length and width of:

(a) the actual strip, and

(b) the padded section.

Questions

1. Which of the bandaids studied would you buy? Explain your choice.

2. Would an elderly person or a young child be able to open and apply each type of bandaid easily?

Research question

What rights does a consumer have if the guaranteed product is unsatisfactory?

Exercise: Value for money

1. Find out the cost of each container of bandaids.

2. Work out the cost of each individual bandaid.

3. Using your answer to the previous question, together with your results from the previous activities, decide which brand of bandaid gives the best value for money.

4. Is the cheapest bandaid the best?

Warranties and guarantees

Manufacturers encourage people to buy goods by providing the goods with guarantees or warranties. Guarantees or warranties are usually written statements, which state that:

- the goods have no defects, and
- that service is available for a specific period of time, if it should be needed.

State governments also try to protect consumers through Sales of Goods Acts and Trade Practices Acts. New South Wales has a Department of Consumer Affairs, which provides advice for consumers.

Read the following warranty and then use the information to answer the questions.

Warranty

Tom Brown offers the following guarantee on this hair dryer. Any defect discovered within three (3) months from the date of purchase, will be repaired free of charge and without labour costs (or at Tom Brown's option, the item may be replaced or the purchase price refunded).

Return the hair dryer along with the receipt, to a Tom Brown store near you. This guarantee does not cover damage caused through accident or misuse, nor does it cover any handling charges.

Trust Tom Brown—Service with a smile

1. What may occur if you return your defective 2-month-old Tom Brown hair dryer to the store?

2. What would you do if the store refused to honour the warranty ?

3. Would your hair dryer still be covered by warranty if you had dropped it? Explain your answer.

4. It is 3 months and 1 day since you purchased the hair dryer and now it does not work. You need the hair dryer and you cannot afford to buy a new one. What should you do? (Consider all possible options.)

5. Consider the statement 'It is better to buy a cheap appliance without a warranty than it is to buy a dearer appliance with a warranty'. Do you agree? Give reasons for your answer.

Extension work

1. Use a dictionary to find the meanings of the words *warranty, guarantee, consumer, defect, manufacturer.*
2. Check the warranties on a number of a particular type of item, say cars or hairdryers. Compare the warranties. Are they all the same?

Chapter 1 topic test: Question sheet
Electricity and magnetism

Do not write on this paper. Write all answers on the answer sheet provided.

Section A

Multiple-choice questions

1. A student wants to take current and voltage measurements in a circuit. The correct way to take measurements is to have:

	the voltmeter wired in...	*the ammeter wired in...*
(a)	series	series
(b)	parallel	parallel
(c)	series	parallel
(d)	parallel	series

2. Julia was carrying out some static electricity activities using several substances:

- She had been told that substance *W* had a positive charge.
- Substance *Y* repelled substance X.
- Substance *X* attracted substance *W*.
- Substance *Z* attracted substance *Y*.

Julia correctly deduced that the charges on the the substances were:

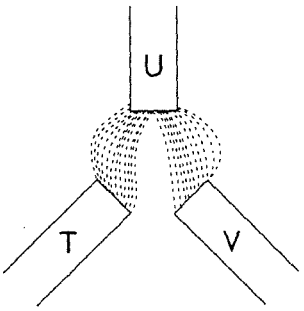
	X	*Y*	*Z*
(a)	negative	positive	negative
(b)	negative	negative	positive
(c)	positive	positive	negative
(d)	positive	negative	positive

3. John was carrying out experiments to find the value of two unknown resistances. He set up one circuit, then dismantled it and then set up another circuit. He used the same battery for each circuit. In the first experiment he measured a voltage of 12 V and a current of 3 A, through the circuit. In the second experiment, he measured a current of 6 A. John knew that Ohm's law: $V = I \times R$ would help him with the calculations. From his results, he calculated the resistances to be:

	In experiment 1	*In experiment 2*
(a)	36 Ω	72 Ω
(b)	36 Ω	insufficient information
(c)	4 Ω	2 Ω
(d)	4 Ω	insufficient information

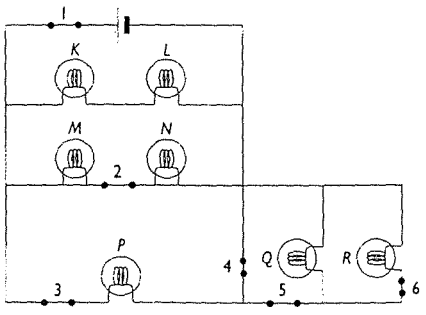
4. From the magnetic field pattern shown in the diagram, the ends of the magnets *T*, *U* and *V* are likely to be:

	T	*U*	*V*
(a)	north pole	south pole	north pole
(b)	north pole	north pole	north pole
(c)	south pole	north pole	north pole
(d)	north pole	south pole	south pole



5. Look carefully at the following circuit diagram. All the lights would be glowing with the circuit set up as shown. However, switches 4 and 6 were then opened. The lights that would still be glowing were:

(a) *M*, *N*, *K*, *L* and *P*
(b) *K*, *L*, *M* and *N*
(c) *M*, *N*, *P*, *Q* and *R*
(d) *P*, *R*, *K* and *L*



(5 × 1 = 5 marks)

(Continued)

Section B

Short-answer questions

6. Explain briefly how you could use an electroscope with a known charge to determine the unknown charge on a charged ruler. (2 marks)

7. (a) On the back of the answer sheet, draw a circuit diagram for the following:
Light globes 1 and 2 are connected in series with a power supply. Globe 3 is connected in parallel with globe 2. (2 marks)

(b) Draw in the position of a voltmeter that would measure the voltage across globe 3. (1 mark)

Section C

Longer questions

8. Part of an electricity account is shown. Two meters have been read and their results are recorded.

Domestic charge	*Last reading*	*This reading*	*kW.h used*	*$*
First 200 kW.h at 15c per kW.h	60 400	60 600	____	____
Remainder 1000 kW.h at 10c per kW.h	56 000	57 000	____	____

Calculate:

(a) kW.h used, from the readings on each meter (1 mark)

(b) the cost of the kW.h on each meter (2 marks)

(c) the total bill from the two meters (1 mark)

(d) Place these results in the correct place on the account (1 mark)

9. Ari and Lulu set up an experiment. They used a power pack, a light globe, electrical leads (one of which was very long) and a compass. They put the light in series with the power pack. The long lead completed the circuit. It was held straight and the power was turned on. Ari held the compass at different positions near the current-carrying wire.

(a) What could have been the aim of this experiment? (2 marks)

(b) What type of results may have been obtained? (2 marks)

(c) Why is the property shown in this experiment important? (1 mark)

Total 20 marks

Chapter 1 topic test: Answer sheet
Electricity and magnetism

Name: _____

Class: _____

Section A

Multiple-choice questions

Circle the best answer for each of the following questions:

1. a b c d **2.** a b c d **3.** a b c d **4.** a b c d **5.** a b c d

(5 × 1 = 5 marks)

Section B

Short-answer questions

6. _____

_____

_____ (2 marks)

7. circuit diagram

Draw this diagram on the back of this answer sheet. (3 marks)

Section C

Longer questions

8. (a) _____

_____ (1 mark)

(b) _____

_____ (2 marks)

(c) _____ (1 mark)

(d) _____

Domestic charge	*Last reading*	*This reading*	*kW.h used*	*$*
First 200 kW.h at 15c per kW.h	60 400	60 600		
Remainder 1000 kW.h at 10c per kW.h	56 000	57 000		
Total account				

(1 mark)

9. (a) _____

_____

_____ (2 marks)

(b) _____

_____

_____ (2 marks)

(c) _____

_____

_____ (1 mark)

Total 20 marks

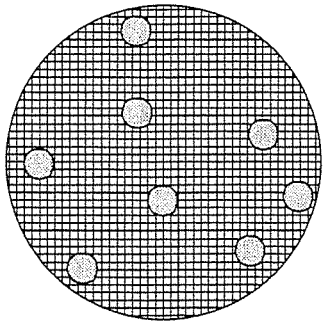
Chapter 2 topic test: Question sheet
Keeping the balance

Do not write on this paper. Write all answers on the answer sheet provided.

Section A

Multiple-choice questions

1. The diameter of a particle in the soil sample shown is closest in size to:
   (a) 8 mm
   (b) 4 mm
   (c) 0.08 mm
   (d) 0.04 mm



Magnification is x 100

2. Tuan took a 15 mL soil sample, added 10 mL of water and stirred the mixture. The volume of the resulting mixture was 20 mL. From these results the best conclusion that Tuan could make, would be:
   (a) some of the water was spilt
   (b) approximately 1/5 of the soil sample was air
   (c) some of the soil had dissolved in the water
   (d) approximately 1/3 of the soil sample was air
3. Some fish in an aquarium died, so water samples were taken from the tank. The results from the tests were:
   - pH = 7
   - methylene blue used to test for the presence of oxygen discoloured
   - turmeric paper used to test for the presence of ammonia was unchanged
   - lead acetate paper used to test for the presence of sulfides was unchanged.

   From these results, the fish may have died because of the presence of:
   (a) too high a pH
   (b) too little oxygen
   (c) too much ammonia
   (d) too many sulfides
4. A food chain for the planet Terra was drawn up:
   lantas → mantas → zantas → kantas
   Note: Kantas also eat lantas
   In earthly terms, it is true to say that:
   (a) zantas are first-order carnivores and mantas are second-order carnivores
   (b) mantas are herbivores and kantas are first-order carnivores
   (c) lantas are producers and kantas are second-order carnivores
   (d) kantas are producers and zantas are second-order carnivores
5. In the 5 hectares of Wongong Park, there are approximately 50 kangaroos and 150 eucalyptus trees. From this information it can be said that:
   (a) the abundance of kangaroos depends on the number of trees
   (b) the distribution of eucalyptus trees is 150
   (c) succession has probably occurred in the area
   (d) the population of kangaroos is approximately 10 per hectare

(5 marks)

Section B

Short-answer questions

6. Too many animals have been kept in a small paddock and the soil has become compacted.
   (a) What is the difference between soil before and after compaction? (1 mark)
   (b) What problems may occur when soil has been compacted? (2 marks)
7. List and give an example of each of the 3 types of adaptations discussed in the chapter. (3 marks)

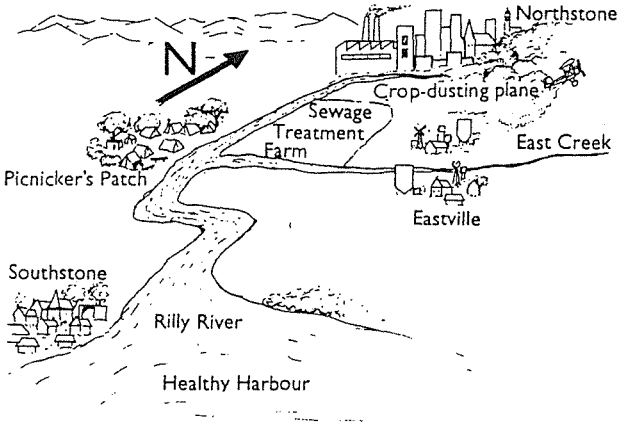
(Continued)

Section C

Longer questions

8. Look at the diagram and consider the following information:

- A new pesticides factory has just opened at the large city of Northstone.
- Farmers in Eastville are fertilising their crops using crop-dusting planes.
- The prevailing winds are from the north-east.
- Both Picnicker's Patch and the sewage farm are situated on Rilly River.

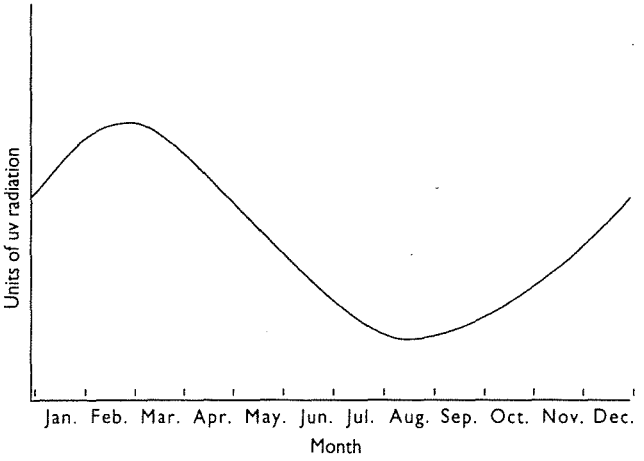


(a) Consider the town of Southstone. Based on the information given and the diagram, comment on:
  (i) the air quality above the town, and
  (ii) the water quality coming from Rilly River (2 marks)

(b) Picnicker's Patch is a popular recreation area, where people use a local caravan and camping park. Water for the park comes straight from the Rilly River.
  (i) Would you use the water?
  (ii) Why or why not? (1 mark)

(c) During last summer, there was a blue-green algae problem in East Creek. What might have caused this growth? (1 mark)

9. The graph shows measurements of ultraviolet (uv) radiation taken over Sunsville, last year. The amount of radiation recorded was found to increase when the ozone layer above Sunsville became thinner.



(a) In which month/months was/were the ozone layer:
  (i) the thinnest?
  (ii) the thickest over Sunsville? (1 mark)

(b) What is believed to be causing the thinning of the ozone layer? (1 mark)

(c) What steps are being taken to stop ozone depletion? (1 mark)

(d) List two things that may occur if the ozone layer was destroyed. (2 marks)

Chapter 2 topic test: Answer sheet
Keeping the balance

Name: _____

Class: _____

Section A

Multiple-choice questions

Circle the best answer for each of the following questions:

1. a b c d **2.** a b c d **3.** a b c d **4.** a b c d **5.** a b c d

(5 × 1 = 5 marks)

Section B

Short answer questions

6. (a) _____

_____ (1 mark)

(b) _____

_____

_____ (2 marks)

7. _____

Type of adaptation	*Example of adaptation*

(3 marks)

Section C

Longer questions

Use the back of the sheet if you need more space to write your answers.

8. (a) _____

_____ (2 marks)

(b) (i) _____

(ii) _____ (1 mark)

(c) _____ (1 mark)

9. (a) _____

_____ (1 mark)

(b) _____

_____ (1 mark)

(c) _____

_____ (1 mark)

(d) _____

_____ (2 marks)

Total 20 marks

Chapter 3 topic test: Question sheet
Changes and matter

Do not write on this paper. Write all answers on the answer sheet provided.

Section A

Multiple-choice questions

1. Consider the following changes:

S—sawing timber
V—cooking an egg
W—formation of stalactites in limestone caves
X—melting butter
Y—exploding fireworks
Z—grinding wheat into flour

Which of the following contains only chemical changes?

(a) *S, V, Z*
(b) *Z, W, X*
(c) *X, Y, S*
(d) *Y, V, W*

2. Two students, Francine and Emile, carried out an experiment using dilute hydrochloric acid and magnesium. They knew that one of the products of the reaction was magnesium chloride and that the other product was a gas. From the table choose the correct gas and the appropriate gas test for this gas.

	Gas	*Test*
(a)	Hydrogen	pop test would be positive
(b)	Hydrogen	gas would relight a glowing splint
(c)	Carbon dioxide	pop test would be negative
(d)	Carbon dioxide	gas would extinguish a flame

3. Consider the equation:

aqueous lead nitrate + aqueous potassium iodide → solid lead iodide + aqueous potassium nitrate

Which of the following statements is true?

(a) A precipitate of lead nitrate is formed.
(b) The reactants are lead nitrate and potassium iodide.
(c) the products are lead nitrate and potassium iodide.
(d) All lead salts do not dissolve.

4. On the planet Kerros, they have different names for the three types of nuclear radiation.

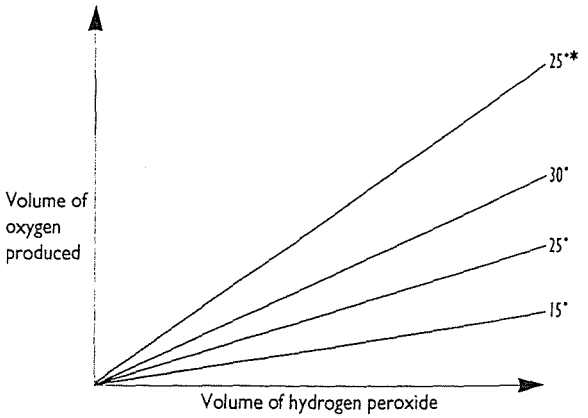
Type of radiation *Description*
Zippo is stopped by several cm of lead foil
Zappo is stopped by paper
Zeppo is not completely stopped by any shielding

On Earth, the equivalent radiations are:

	Alpha	*Beta*	*Gamma*
(a)	Zippo	Zappo	Zeppo
(b)	Zappo	Zeppo	Zippo
(c)	Zeppo	Zippo	Zappo
(d)	Zappo	Zippo	Zeppo

5. Look at the graph showing the rate of production of oxygen using hydrogen peroxide. From the graph, in this set of experiments, it would be true to say that the best yield of oxygen was obtained when the:

(a) temperature was raised
(b) nothing was added
(c) manganese dioxide was added
(d) temperature was lowered



* manganese dioxide present

(5 marks)

(Continued)

Section B

Short-answer questions

6. On your answer sheet, complete the word equations for the following reactions:

(a) cobalt chloride + silver nitrate →

(b) sodium carbonate + copper sulfate →

(c) barium nitrate + magnesium chloride →

(3 marks)

7. Which acid would you react with sodium hydroxide to produce:

(a) sodium chloride?

(b) sodium nitrate? (1 mark)

8. List two uses of radioisotopes. (1 mark)

Section C

Longer questions

9. People sometimes use antacid tablets for upset stomachs. The antacid reacts with excess acid to produce a harmless salt and water. The acid in the stomach is hydrochloric and one of the antacids used in the tablets is magnesium hydroxide.

(a) Write the word equation for this reaction. (Assume that the hydroxide and the salt are dissolved in water.) (2 marks)

(b) Using the following list and your general knowledge, write a *balanced* chemical formula equation for the reaction in (a).

hydrochloric acid HCl

magnesium hydroxide $Mg(OH)_2$

magnesium chloride $MgCl_2$

(3 marks)

10. (a) The following table lists the half-lives of some radioactive elements. Use this information to answer parts (i) and (ii).

Element	*Half-life*
Cobalt 60	5.3 years
Caesium 137	30 years
Technetium 99m	6.02 hours
Uranium 238	45 000 000 000 years
Iodine 123	13.1 hours
Nitrogen 13	10 minutes

(i) Why do you think that people are concerned about uranium 238?

(ii) Special cyclotrons are being built inside hospitals to produce short-lived radioisotopes such as nitrogen 13. Why is this necessary?

(b) Irradiated food stays fresh for long periods of time, without refrigeration.

(i) List two advantages of irradiating food (or subjecting food to radiation).

(ii) Give one possible disadvantage.

(5 marks)

Chapter 3 topic test: Answer sheet
Changes and matter

Name: _____

Class: _____

Section A

Multiple-choice questions

Circle the best answer for each of the following questions:

1. a b c d **2.** a b c d **3.** a b c d **4.** a b c d **5.** a b c d

(5 × 1 = 5 marks)

Section B

Short-answer questions

6. (a) cobalt chloride + silver nitrate →

_____

(b) sodium carbonate + copper sulfate →

_____

(c) barium nitrate + magnesium chloride →

_____ (3 marks)

7. acid (a) _____

acid (b) _____ (1 mark)

8. _____

_____ (1 mark)

Section C

Longer questions

Use the back of the sheet if you need more space to write your answers.

9. (a) Word equation:

_____

_____ (2 marks)

(b) Balanced formula equation:

_____

_____ (3 marks)

10. (a) (i) _____

_____

_____ (1 mark)

(ii) _____

_____

_____ (1 mark)

(b) (i) _____

_____

_____

_____ (2 marks)

(ii) _____

_____ (1 mark)

_____ **Total** 20 marks

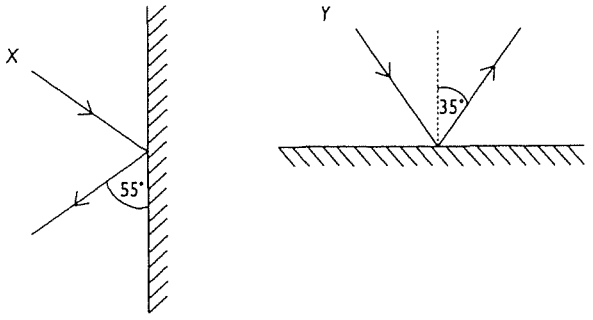
Chapter 4 topic test: Question sheet—Waves

Do not write on this paper. Write all answers on the answer sheet provided.

Section A

Multiple-choice questions

1. An echo occurs when a sound wave:
   (a) reflects (c) resonates
   (b) refracts (d) has its frequency changed
2. In the diagrams, the angles of incidence are:



	Angle of incidence in X	*Angle of incidence in Y*
(a)	35°	55°
(b)	35°	35°
(c)	55°	55°
(d)	55°	35°

3. A blue jumper appears blue because:
   (a) blue is absorbed and reflected by the jumper
   (b) blue is refracted from the jumper into the human eye
   (c) all colours except blue are absorbed and blue light is transmitted through the jumper
   (d) all colours except blue are absorbed and blue light is reflected by the jumper
4. Consider the following information.
   A bat emits sounds in the 10 000–50 000 Hz range, while people produce sounds in the range 85–1120 Hz

Table 4. *Highest audible range and age*

Age	*Approximate highest frequency heard (Hz)*
Under 20	20 000
20–35	16 000
36–45	12 000
46–55	8 000
56 upwards	5 000

From the information, it would be true to say that hearing loss with age would mean that most people over 46 would be:
   (a) able to hear some sounds emitted by bats, but unable to hear sounds produced by other people
   (b) able to hear all sounds emitted by bats, but unable to hear all sounds produced by other people
   (c) able to hear no sounds emitted by bats, but able to hear sounds produced by other people
   (d) able to hear all sounds emitted by bats and by people.
5. The film in a camera receives images. The part of the eye that receives images is the:
   (a) lens (c) iris
   (b) retina (d) optic nerve (5 marks)

Section B

Short-answer questions

6. (a) On the diagram on the answer sheet, label the following:
   (i) pinna
   (ii) cochlea
   (iii) eardrum
   (b) Write a sentence about each of the parts mentioned in (a). (3 marks)
7. (a) On the back of the answer sheet, draw a diagram showing a ray of light travelling from glass to air.
   (b) On the same diagram draw the ray that occurs when the critical angle is reached. (2 marks)

Section C

Longer questions

8. (a) Construct a wave on the grid provided on the answer sheet. The wave should have the following characteristics:
   wavelength = 8 cm
   amplitude = 2 cm
   Label one trough and crest as well as the wavelength and amplitude. (3 marks)
   (b) If the wave in (a) was a representation of a sound wave, what would you notice about the sound if:
   (i) the amplitude of the wave doubled?
   (ii) the wavelength halved? (2 marks)
9. (a) Draw a sketch of a standing wave that a violin string might produce.
   (b) Label at least one node and one antinode on the standing wave in (a).
   (c) What vibrates when a pipe organ is played?
   (d) Why does the same note sound different on different instruments?
   (e) A note played on a trumpet may cause a nearby drum to vibrate. What property of sound causes the drum vibration? (5 marks)

Chapter 4 topic test: Answer sheet
Waves

Name: _____

Class: _____

Section A

Multiple-choice questions

Circle the best answer for each of the following questions.

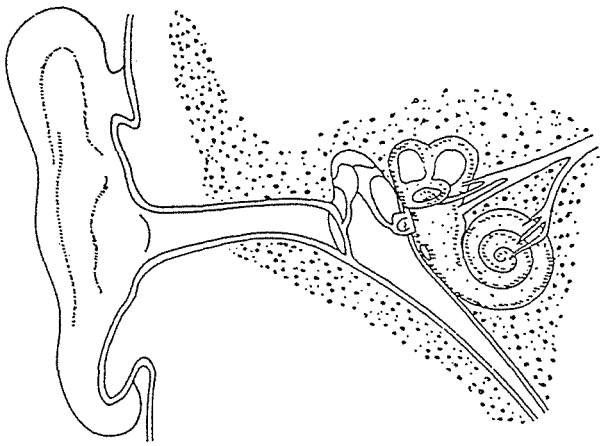
1. a b c d **2.** a b c d **3.** a b c d **4.** a b c d **5.** a b c d

(5 × 1 = 5 marks)

Section B

Short-answer questions

6. (a)



(b) (i) pinna _____

_____

(ii) cochlea _____

_____

(iii) eardrum _____

_____ (3 marks)

7. Diagram

Draw this diagram on the back of this answer sheet.

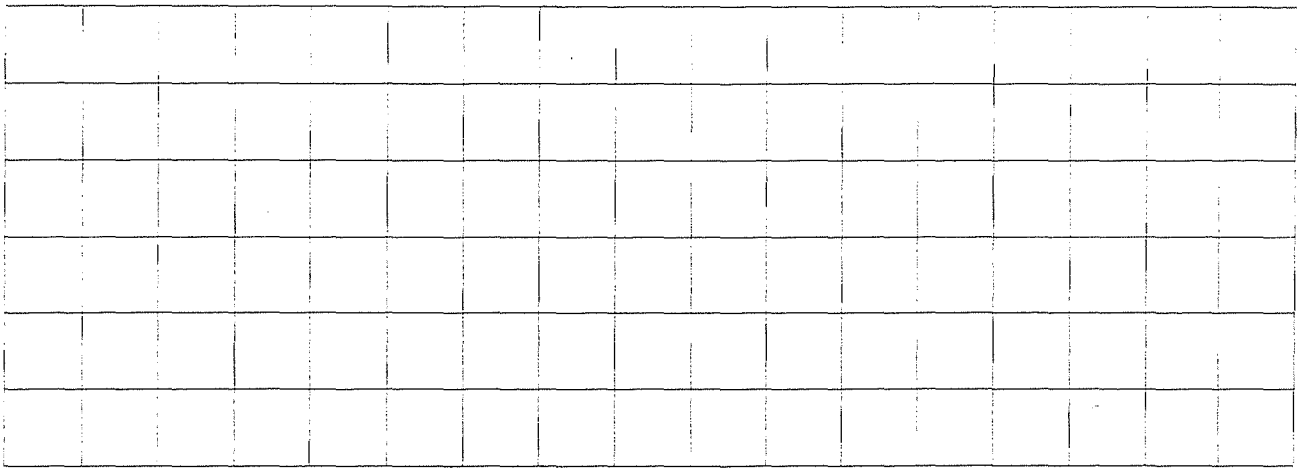
(2 marks)

(Continued)

Section C

Longer questions

8. (a)



(3 marks)

(b) If (i) the amplitude of the wave doubled, _____

_____

(ii) the wavelength halved, _____

_____ (2 marks)

9. (a) and (b) Diagram

(c) _____

(d) _____

_____

(e) _____ (5 marks)

Total 20 marks

Chapter 5 topic test: Question sheet
Responding and communicating

Do not write on this paper. Write all answers on the answer sheet provided.

Section A

Multiple-choice questions

1. The new student did not understand what was being said in class because the language was new. The communication problem occurred because messages from the teacher were being:
   (a) transmitted but not received
   (b) received but not being transmitted
   (c) interpreted but not being transmitted
   (d) transmitted, received, but not interpreted

2. Sally, George, Melinda and Fred each carried out experiments with similar plants.
   - Sally's plant grew toward the light.
   - George's plant grew toward water.
   - The shoots of Melinda's plant grew upwards and roots grew downwards.
   - Fred's plant twisted around the stake that he had placed in the flower pot.

   The following table names the tropisms involved:

	Sally	*George*	*Melinda*	*Fred*
(a)	Geotropism	thigmotropism	phototropism	hydrotropism
(b)	Phototropism	thigmotropism	hydrotropism	geotropism
(c)	Phototropism	hydrotropism	geotropism	thigmotropism
(d)	Geotropism	thigmotropism	phototropism	hydrotropism

3. The way in which the message-response occurs in the nervous system involves the following steps:
   L— decision about the appropriate response is made
   M—action is taken
   N—the message is sent to the central nervous system
   P—information is received by sensors
   R—message is sent from the brain to an effector organ

   The order in which these steps occur is
   (a) *P, N, L, R, M* (b) *R, L, P, M, N*
   (c) *M, L, N, R, P* (d) *N, P, M, L, R*

4. Which of the following statements about hormones is true?
   (a) Hormones are produced in muscles and allow the body to react quickly in emergencies.
   (b) Reflex actions rely on the fast production of hormones.
   (c) Hormones are chemicals produced in glands.
   (d) Only animals produce hormones.

5. Pirate Peta had a parrot that sat on her shoulder. The bird had initially been held there using a chain. After a while the chain was no longer needed. The bird would hold biscuits in its claw, while eating them. Which of the following is true about the bird's abilities?

	Ability to stay on Peta's shoulder (without a chain)	*Ability to hold onto the biscuit*
(a)	Present from birth	present from birth
(b)	Due to conditioning	due to conditioning
(c)	Present from birth	due to conditioning
(d)	Due to conditioning	present from birth

(5 marks)

(Continued)

Section B

Short-answer questions

6. Using the cartoons below, write down two examples of a stimulus and the response to that particular stimulus. (2 marks)
7. Whales and dolphins use sound to communicate with each other. People use sounds as well as other methods to communicate. One method of communication is unique to humans. Name this type of communication. (1 mark)
8. Complete the table on the answer sheet. (2 marks)

Section C

Longer questions

9. Hui and Amiko each carried out an activity to compare their reaction times. When a light flashed on, the students had to press a buzzer. The light and the buzzers were linked to a timer. The results are shown in the table.

Trial number	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Hui's time (seconds)	1	0.8	0.7	0.8	1.3	0.8	0.7
Amiko's time (seconds)	1.3	1.0	1.0	0.9	1.0	1.0	0.9

(a) Plot the results, as a line graph, on suitable axes on your answer sheet. (Plot both Hui's and Amiko's on the same set of axes.) (3 marks)

(b) Comment on the experimental results. (1 mark)

(c) Write an appropriate conclusion for the activity.

_____

_____

_____

(1 mark)

10. Auxins are special chemicals.
    (a) What type of living thing produces these chemicals?
    (b) Give an example of a function of an auxin.

Other life forms produce different chemicals in response to certain stimuli.

    (c) What are these chemicals called?
    (d) Give an example of one of these chemicals and state its function. (5 marks)

Total 20 marks

BLM 47b

Chapter 5 topic test: Answer sheet
Responding and communicating

Name: _____

Class: _____

Section A

Multiple-choice questions

Circle the best answer for each of the following questions:

1. a b c d **2.** a b c d **3.** a b c d **4.** a b c d **5.** a b c d

(5 × 1 = 5 marks)

Section B

Short-answer questions

6. _____

_____

_____

_____ (2 marks)

7. _____ (1 mark)

_____

8.

sense	*organ responsible*	*receptor*
touch	skin	touch sensors in skin
taste	_____	_____
smell	_____	_____

(2 marks)

Section C

Longer questions

9. (a) Plot the graph on the back of this sheet. (3 marks)

(b) _____

_____

_____ (1 mark)

(c) _____

_____

_____ (1 mark)

10. (a) _____

(b) _____

(c) _____

(d) _____

_____ (5 marks)

Total 20 marks

Chapter 6 topic test: Question sheet
Changes in the Earth's crust

Do not write on this paper. Write all answers on the answer sheet provided.

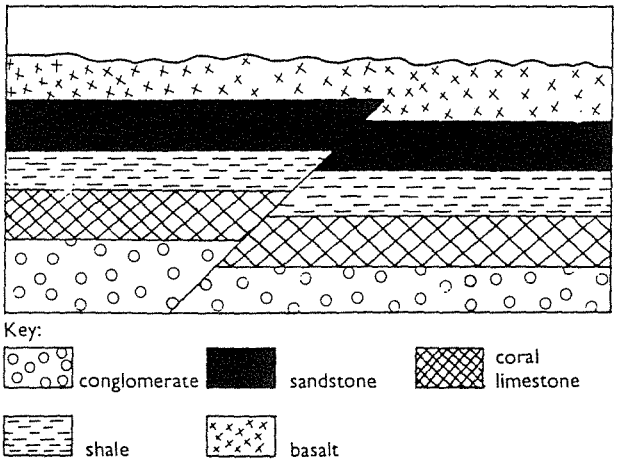
Section A

Multiple-choice questions

1. Which of the following rocks are all correctly classified?

	Sedimentary	*Igneous*	*Metamorphic*
(a)	Sandstone	slate	shale
(b)	Basalt	limestone	marble
(c)	Quartzite	gabbro	coal
(d)	Conglomerate	granite	gneiss

2. If a joint forms in a series of rock layers, as these layers are subjected to compression (inwards) forces, the feature most likely to form is:
   (a) an anticline
   (b) a normal fault
   (c) an upthrust fault
   (d) a reverse fault
3. When waves wear away cliff faces and wind blows topsoil, the agents of erosion are:
   (a) water and wind
   (b) waves and topsoil
   (c) topsoil and water
   (d) water, waves, wind and topsoil
4. Theories have been developed to explain the changing Earth. The most widely accepted theory is:
   (a) expanding Earth
   (b) plate tectonics
   (c) shrinking Earth
   (d) volcanic activity



5. In the preceding cross-section:
   (a) conglomerate was laid down after coral limestone
   (b) shale was laid down after sandstone
   (c) basalt is the most recent layer
   (d) sandstone is the oldest layer

(5 marks)

Section B

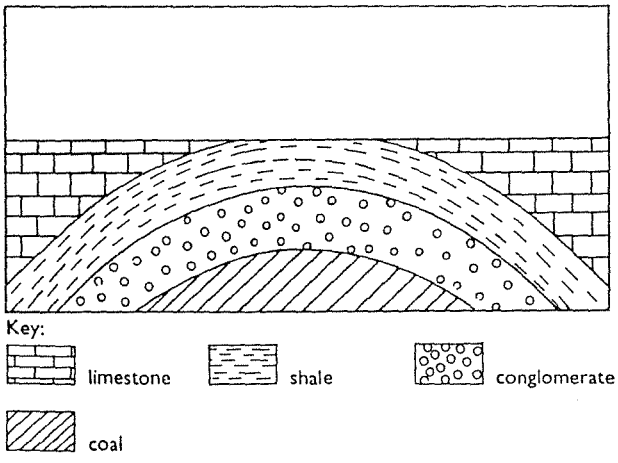
Short-answer questions

6. Explain briefly why the Richter scale of earthquake intensity is used more widely than the Mercalli scale. (2 marks)
7. Give examples of two erosional land forms found in deserts. Describe each land form. (You may draw and label diagrams if you wish. Draw the diagrams on the back of the answer sheet.) (3 marks)

Section C

Longer questions

8. Describe the geological history of the area shown in the diagram. Remember to include what each rock type indicates about the history of the area.



(6 marks)

9. Farmer Elise is concerned about her farm. Sheep have eaten grass so that the land is now bare, risking major erosion problems. Explain two ways to avoid erosion of topsoil. (4 marks)

Chapter 6 topic test: Answer sheet
Changes in the Earth's crust

Name: _____

Class: _____

Section A

Multiple-choice questions

Circle the best answer for each of the following questions:

1. a b c d **2.** a b c d **3.** a b c d **4.** a b c d **5.** a b c d

(5 × 1 = 5 marks)

Section B

Short-answer questions

6. _____

_____

_____

_____ (2 marks)

7. _____

_____

_____

_____ (3 marks)

Diagram (optional)

Draw your diagrams on the back of this answer sheet.

Section C

Longer questions

8. _____

_____

_____

_____

_____

_____

_____

_____ (6 marks)

9. _____

_____

_____

_____ (4 marks)

Total 20 marks

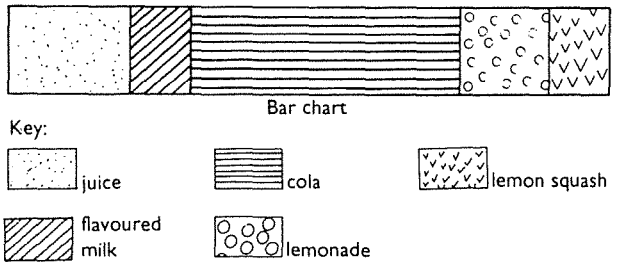
Chapter 7 topic test: Question sheet
Consumer science

Do not write on this paper. Write all answers on the answer sheet provided. You may use a protractor and a calculator, if you wish.

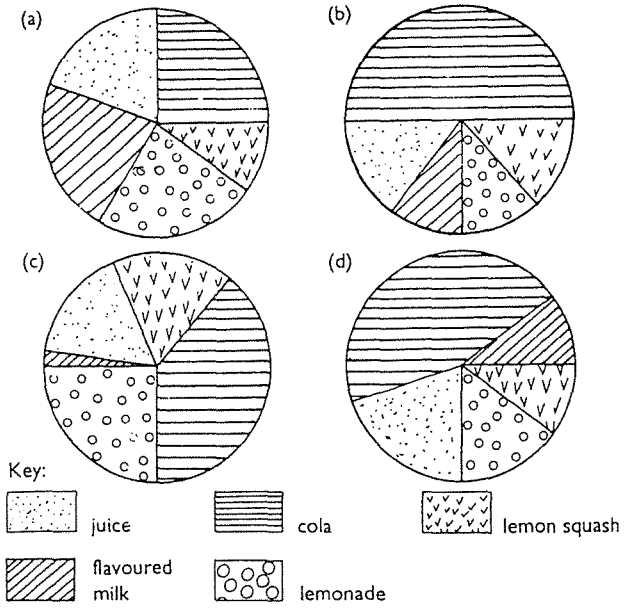
Section A

Multiple-choice questions

Use the following information about drink sales at the school canteen to answer Questions 1 and 2.



1. From the bar chart it can be seen that the total percentage of students drinking:
   (a) juice and milk is greater than those drinking cola
   (b) milk and lemonade is greater than those drinking juice
   (c) lemon squash and lemonade is less than those drinking juice
   (d) cola is less than those drinking milk and lemonade
2. The information shown in the bar chart can also be shown as the pie chart:



3. Effie bought a watch with a 12 months warranty. After 2 months the watch stopped working. Effie should:
   (a) buy a new watch
   (b) take the watch back to the store where it was purchased
   (c) call the relevant consumer affairs department
   (d) take the manufacturer to court for supplying poor-quality goods
4. The results of a survey about different refrigerated desserts are given in the table.

Desert	*Size of container (g)*	*Cost ($)*
Orango	250	2.00
Lemona	100	1.00
Berry	375	3.00
Limo	250	2.75
Applino	100	1.50

Which two desserts offer the best value for money?
   (a) orango and berry
   (b) berry and lemona
   (c) applino and orango
   (d) limo and applino
5. Spiro was surveying the cost of antacid tablets in Australia. He bought tablets from five separate stores in his home town and recorded the cost. He then reported that antacid tablets were cheaper in supermarkets than in chemist shops. Spiro's experiment could best be improved by:
   (a) visiting more shops in his home town
   (b) going to more towns to visit more shops
   (c) buying more tablets in his home town
   (d) repeating the experiment in a month's time

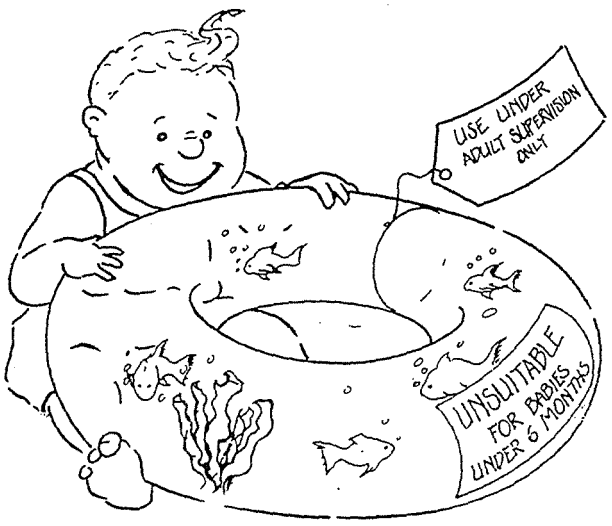
(5 marks)

(Continued)

Section B

Short-answer questions

6. The diagram shows a new toy designed for babies. It is a transparent plastic ring-shaped cushion that may be filled with water. Little creatures then float in the clear ring.



(a) List the precautions given by the manufacturer. (1 mark)

_____

_____

_____

(b) Would you buy this toy for a baby. Why/ why not? (2 marks)

_____

_____

_____

7. Imagine that a new product to stop hair going grey has just been developed. Who would be the best people to trial the new product? Explain your choice. (2 marks)

Section C

Longer questions

8. The following numbers show the sales figures for Skiddo roller skates at a particular store for a year-long period.

Month	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*
Sales (thousands of $)	22	20	18	15	30	20
Month	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
Sales (thousands of $)	22	20	23	25	26	33

(a) Plot these figures as a histogram. (2 marks)

(b) When were sales the highest? (1 mark)

The store had *one* major advertising campaign during the year.

(c) When do you think that the campaign occurred? Why? (2 marks)

9. Ingrid was carrying out an experiment related to 'blobby' plastic substances. These substances are designed to be rolled into balls and squeezed behind posters to stick posters to walls. Ingrid:

- rolled 2 cm lengths of Type *X* and Type *Y* substances
- used 4 pieces of Type *X* to stick one poster to a brick wall
- used 4 pieces of Type *Y* to stick a similar poster to a painted wall

Type *Y* held the poster for a longer period than Type *X*. Ingrid concluded that Type *Y* was the better product.

(a) What was the aim of Ingrid's experiment?

(b) What were the variables in her experiment?

(c) What variable did she control in her experiment?

(d) Could her experiment be improved? If so, how?

(e) Was her conclusion valid?

(5 marks)

Chapter 7 topic test: Answer sheet
Consumer science

Name: _____

Class: _____

Section A

Multiple-choice questions

Circle the best answer for each of the following questions:

1. a b c d **2.** a b c d **3.** a b c d **4.** a b c d **5.** a b c d

(5 × 1 = 5 marks)

Section B

Short-answer questions

6. (a) _____

_____ (1 mark)

(b) _____

_____ (2 marks)

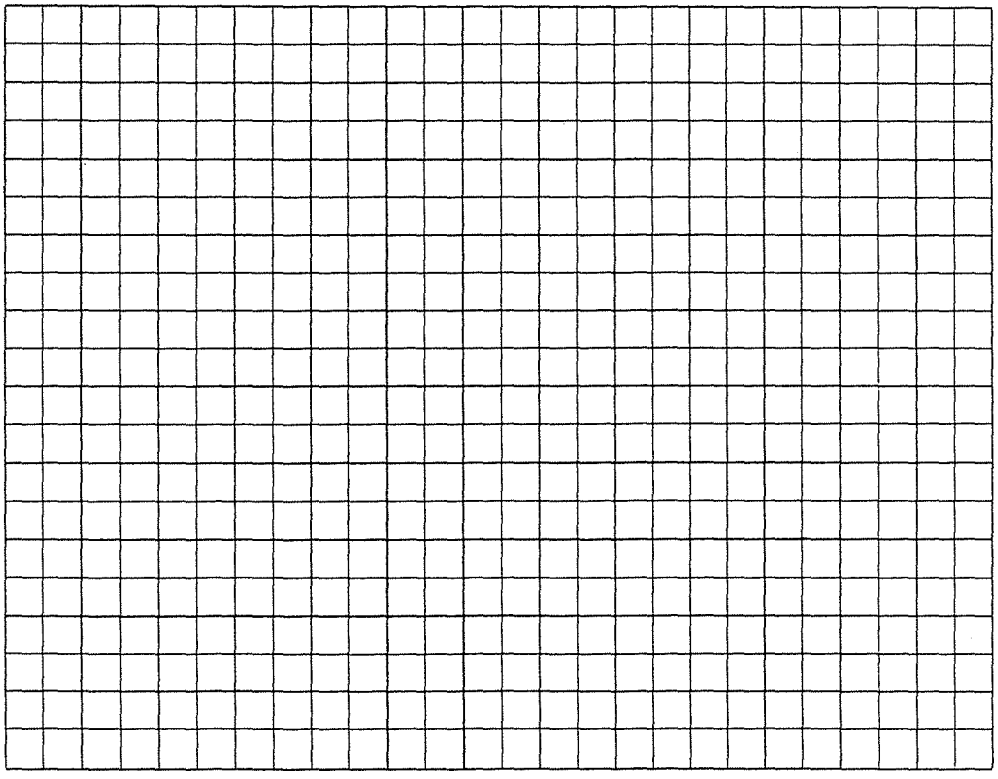
7. _____

_____ (2 marks)

Section C

Longer questions

8. (a) Histogram



(2 marks)

(Continued)

(b) _____

_____ (1 mark)

(c) _____

_____

_____

_____ (2 marks)

9. (a) _____

_____ (1 mark)

(b) _____

_____

_____ (1 mark)

(c) _____ (1 mark)

(d) _____

_____

_____ (1 mark)

(e) _____ (1 mark)

Total 20 marks

Practical exam: Work cards

Activity 1: Volume of the rubber stoppers

Using any method and the equipment provided, work out the volumes of two rubber stoppers. Record the number of each stopper that you use.

You are provided with a ruler, a multiple-arm beam balance, two measuring cylinders and water.

Activity 2: Looking at cells

There are four microscope slides provided. Your task is to draw two of these slides.
You must firstly carefully set up the slides. **Broken slides will lead to loss of marks.** (If you have time, you may like to draw one of the slides using a different magnification.)
Remember that the slides must be removed from the stage, before you leave this activity.

Activity 3: Observation skills

Add one marble chip to **one** of the test tubes provided. The test tubes each contain dilute hydrochloric acid.
When you have completed this activity, pour the used solution into the plastic container provided.
Record your observations, and write a word equation for the reaction.
Suggest a test you could carry out on one of the products, and the possible results to this test. (Do not actually do this test.)

Activity 4: Wiring up a circuit

You are provided with a power pack, two light globes, leads and a tapping key.
Your task is to use this equipment to set up a circuit that allows two globes to light when the power is turned on.
[If you have time, wire up a circuit that will allow either one *or* two globes to be turned on, when the power is switched on. (You will need to use the tapping key.)]

Draw your circuit/s. **Take your circuit apart.**

Activity 5: Ants in the nest

Using the grid and the random number table (if necessary), estimate the number of ants in the nest.
Show all calculations.

Activity 6: Finding the mass

Using the multiple-arm beam balance, find the masses of any three of the objects provided.
Record the name of each item together with its mass.
Remember to repeat all readings to check accuracy.

Practical exam: Answer sheet

Name: _____

Class: _____

Rules:

- There are 5 minutes allowed for each activity.
- There must be absolute silence.
- You must move to the next activity when told to do so.
- You will be allocated an activity on which to start. You will then move to the next activity. (For example, if you start on Activity 3, your next activity will be Activity 4.)
- Follow instructions. Do not do extra work because you may run out of time.
- Clean up during the 5 minutes. Marks will be deducted if you do not leave the activity as you found it.

Activity 1: Volume of the rubber stoppers

Record all readings taken, and your final measured/calculated volume. Remember to repeat the activity to check accuracy.

Working space:

Volume of rubber stopper no ____:
Volume of rubber stopper no ____:

Activity 2: Looking at cells

Use two of the slides provided. Carefully draw what you see. Remember to record which slide you have used. You may use more than one magnification if you have time.

Activity 3: Observation skills

Carry out the activity described on the instruction sheet.
Record all observations. Write a word equation for the reaction that may be occurring.

Observations:

Word equation:

Possible test for one of the products (including results expected):

(Continued)

Activity 4: Wiring up a circuit

Using the equipment provided, set up a circuit that allows two globes to light when the power is turned on.

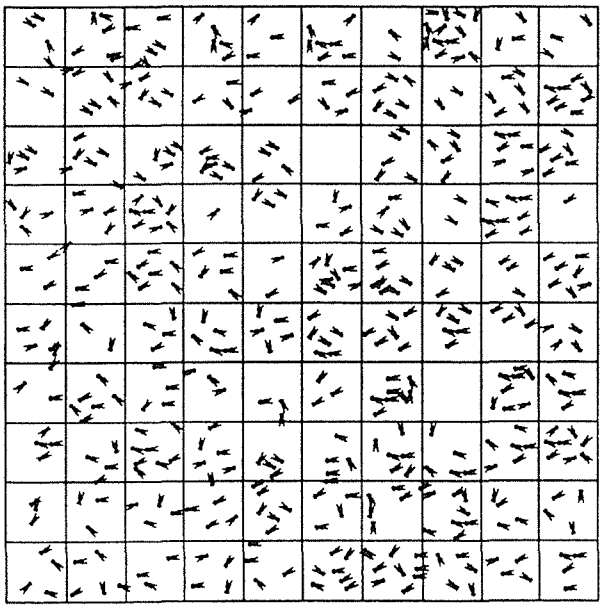
[If you have time, wire up a circuit that will allow either one *or* two globes to be turned on, when the power is switched on. (You will need to use the tapping key.)]

Draw your circuit/s.

Take your circuit apart.

Activity 5: Ants in the nest

Using the information provided, estimate the number of ants in the nest. Do *not* try to count all the ants. This is an estimation exercise. Show all calculations.



The number of the ants in the nest is approximately:

Calculations:

Activity 6: Finding the mass

Using the multiple-beam balance, find the masses of any three of the objects provided. Record the name of each item together with its mass.

	Object	*Mass*
1.		
2.		
3.		

BLM 50c

Answers to Blackline masters

BLM 1: Barrier game: Electricity and magnetism

1. battery symbol reversed
2. closed switch opened
3. and 4. same—no difference
5. N-S became N-N.
6. N-S became S-N.
7. 2 globes in series became 2 globes in parallel.
8. Ammeter symbol became voltmeter symbol.
9. Position of 2 ohm resistor and light globe (in different parts of the parallel circuit) were exchanged.
10. 2 parts of a 3 part parallel circuit were changed; 1 ohm and 2 ohm/1 ohm became 1 ohm/2 ohm (lowest 1 ohm section unchanged).
11. The open switch closed, the closed switch opened.
12. The ammeter was removed from the circuit.

BLM 2: Meter reading practice: The analogue multimeter

1. B. (7, 35, 175, 700) volts (0.035, 1.75, 17.5, 175) mA (10, 100, 1 000, 10K) ohm
   C. (2, 10, 50, 200) volts (0.01, 0.50, 5, 50) mA (100, 1 000, 10K, 100K) ohm
   Note: K = × 1000

BLM 3: Using Ohm's law

1. (a) 6 V (b) 20 V (c) 21 V (d) 120 V (e) 150 V
2. (a) 2 A (b) 10 A (c) 4 A (d) 4 A (e) 2 A
3. (a) 20 Ω (b) 6 Ω (c) 4 Ω (d) 4 Ω (e) 2 Ω
4. (a) 2 Ω (b) 4 A (c) (i) 15 V (ii) 10 V

Extension work

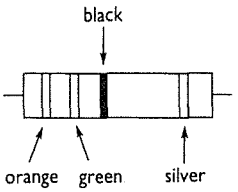
$R_{(c)} = 1.5 + 2 = 3.5\ \Omega$ $\quad R_{(d)} = 2 + 2 = 4\ \Omega$

$V_{(c)} = 10 \times 3.5 = 35$ V $\quad V_{(d)} = 5 \times 4 = 20$ V

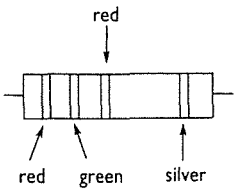
BLM 4: Reading resistor codes

1. (a) 6000 (6 K) Ω ±5%
   (b) 87 000 (87 K) Ω ±10%
   (c) 45 Ω ±5%
   (d) 100 000 (100 K) Ω ±10%
   (e) 250 Ω ±5%
   (f) 9600 (9.6 K) Ω ±10%

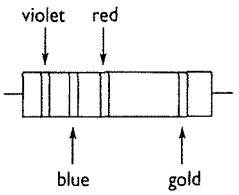
2. (a) 35 Ω ± 10%



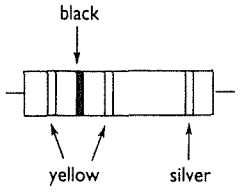
(b) 2500 Ω ± 10%



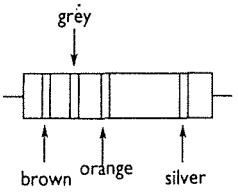
(c) 7600 Ω ± 5%



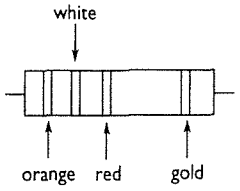
(d) 400 000 Ω ± 10%



(e) 18 000 Ω ± 10%



(f) 3900 Ω ± 5%



BLM 5: The cost of power

Domestic charge	*Last reading*	*This reading*	*kW.h used*	*$*
Domestic				
First 300 kW.h at 15c per kW.h	45 800	46 100	300	45.00
Remainder 1500 kW.h at 10c per kW.h	32 000	33 500	1500	150.00
			Subtotal	195.00
Offpeak tariff				
800 kW.h at 5c per kW.h	17 500	18 300	800	40.00
			Subtotal	40.00
		This period's electricity charge		235.00

1. (a) The electricity company needs to cover the expenses related to the supply of electricity.
   (b) The offpeak rate is the least expensive because electricity is supplied at a time when much less power is being used—usually in the middle of the night.

2.

Appliance	Power usage after 1 hour (kW.h)	Cost (c)
Clock radio	0.005	0.075
Cassette recorder	0.010	0.15
Small fan	0.020	0.30
Light globe	0.060	0.90
Sander	0.160	2.40
Hair dryer	1.250	18.75
Electric jug	2.400	36.00

(a) Answer is in Cost (c) column above.

(b) (i) Clock radio for 60 hours = 0.075 × 60 = 4.5 cents
cassette recorder for 40 hours = 0.15 × 40 = 6 cents, so the cassette recorder would cost more.

(ii) Small fan for 10 hours = 0.30 × 10 = 3 cents
electric jug for 3 minutes = 36 / 20 = 1.8 cents
so the small fan would cost more.

BLM 6: Superconductor discoverers

1. ohM
2. insUlator
3. fiLament
4. kiLowatt
5. currEnt
6. Resistance
7. alternAting
8. traNsformer
9. Direct
10. laBoratory
11. voltmEter
12. fielD
13. geNerator
14. electrOscope
15. paRallel
16. Zirconium

The names of the men were K. Alex Müller and J. Georg Bednorz.

BLM 9: Adaptations

(a) *Koalas'* two 'thumbs' help them to climb to obtain food, their nocturnal habits cut down their need for water during the day, they have pouches to protect their young.

(b) *Platypuses* burrow in river banks to make nests where they are protected from predators. Adult's bony plates allow them to grind up food.

(c) *Eucalyptus trees'* oily leaves, and the vertical hanging of these leaves in the mid-day sun, both prevent loss of moisture.

(d) *Grevillea's* spiky leaves discourage animals from eating them. Bright flowers attract insects to pollinate the plant.

Possible answers to creative exercise: Planet Coloura
Anything reasonable is acceptable in this exercise.

To cater for some of the information provided, animals will need to have different colours to ensure camouflage, depending on where they live. They may need special eyes/eyelids to provide shade from the two suns. They may also need special noses to cope with the strong odours around them. They will not need furry coats at a constant moderate temperature.

The information purposely did not say specifically whether at least one of the suns is always shining. (The information does suggest that there may be constant daylight due to the constant temperature.) The planet may have perpetual day. If this is the case, the plants will need special mechanisms to deal with constant daylight.

BLM 15: The first twenty elements

Element	Symbol	Symbol in equations	Metal or non-metal	Additional information
Hydrogen	H	$H_{2(g)}$	n-m	colourless, odourless explosive gas
Helium	He	$He_{(g)}$	n-m	noble gas, light, unreactive, used in some balloons
Lithium	Li	$Li_{(s)}$	m	reactive metal
Beryllium	Be	$Be_{(s)}$	m	rare metal, used in alloys and in nuclear reactors
Boron	B	$B_{(s)}$	semi-metal	found in several coloured crystalline forms, used in metal industries
Carbon	C	$C_{(s)}$	semi-metal	element exists in several forms incl. graphite, diamond, bucky balls
Nitrogen	N	$N_{2(g)}$	n-m	most abundant gas in atmosphere, used to fill incandescent light globes, element present in animal and plant protein
Oxygen	O	$O_{2(g)}$	n-m	second most abundant gas in atmosphere, most abundant element in Earth's crust, essential for life
Fluorine	F	$F_{2(g)}$	n-m	most reactive gas known, pale yellow, toxic, many of its compounds can cause severe burns

(Continued)

Element	*Symbol*	*Symbol in equations*	*Metal or non-metal*	*Additional information*
Neon	Ne	$Ne_{(g)}$	n-m	noble gas, unreactive, used in some lights
Sodium	Na	$Na_{(s)}$	m	very reactive soft metal, explodes in water, stored under oil or kerosene
Magnesium	Mg	$Mg_{(s)}$	m	reactive metal, lightest structural metal, used in alloys
Aluminium	Al	$Al_{(s)}$	m	reactive metal, protected by oxide layer
Silicon	Si	$Si_{(s)}$	semi-metal	second most abundant element in the Earth's crust, used in computer chips
Phosphorus	P	$P_{(s)}$	n-m	compounds of phosphorus make up chromosomes, animal skeletons; used in detergents, animal food, water softeners
Sulfur	S	$S_{(s)}$	n-m	exists in many different forms
Chlorine	Cl	$Cl_{2(g)}$	n-m	green choking gas (*not* the white substance used in swimming pools)
Argon	Ar	$Ar_{(g)}$	n-m	noble gas, unreactive, used in welding and in lights
Potassium	K	$K_{(s)}$	m	more reactive than sodium, reacts violently with ice; compounds used in glass and soap manufacture
Calcium	Ca	$Ca_{(s)}$	m	metal protected by an oxide layer, element essential to animal life, present in shells, bone

BLM 16B: Using the chemical jigsaw

Note: Intentionally, there was no mention of states of reactants and products in this exercise. The aim of the exercise is to get students to realise that ions (do not use this word at this stage) simply rearrange in a chemical reaction.

These jigsaws are inappropriate for non-ionic substances.

1. (a) $Pb(NO_3)_2 + 2KOH \rightarrow Pb(OH)_2 + 2KNO_3$
   (b) $CuSO_4 + CoCl_2 \rightarrow CuCl_2 + CoSO_4$
   (c) $Mg(NO_3)_2 + Na_2CO_3 \rightarrow MgCO_3 + 2NaNO_3$
   (d) $2HCl + Pb(NO_3)_2 \rightarrow 2HNO_3 + PbCl_2$
   (e) $2NaOH + MgSO_4 \rightarrow Na_2SO_4 + Mg(OH)_2$

BLM 17: Challenging chemical equations

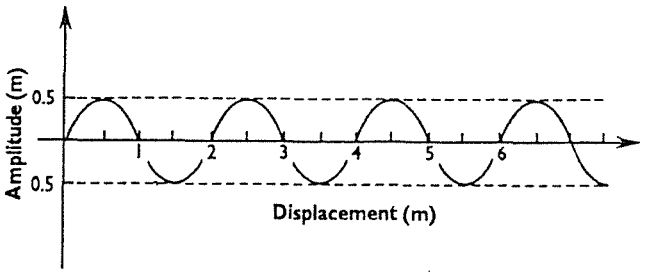
1. (a) $HCl_{(aq)} + NaOH_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$
   (b) $H_2SO_{4(aq)} + 2KOH_{(aq)} \rightarrow K_2SO_{4(aq)} + H_2O_{(l)}$
   (c) salt + water
2. (a) $H_2SO_{4(aq)} + Zn_{(s)} \rightarrow ZnSO_{4(aq)} + H_{2(g)}$
   (b) $2HCl_{(aq)} + Mg_{(s)} \rightarrow MgCl_{2(aq)} + H_{2(g)}$
   (c) salt + hydrogen gas
   (d) $2Na_{(s)} + 2H_2O_{(l)} \rightarrow 2NaOH_{(aq)} + H_{2(g)}$
3. (a) $2HCl_{(aq)} + Na_2CO_{3(s)} \rightarrow 2NaCl_{(aq)} + CO_{2(g)} + H_2O_{(l)}$
   (b) $2HNO_{3(aq)} + K_2CO_{3(aq)} \rightarrow 2KNO_{3(aq)} + CO_{2(g)} + H_2O_{(l)}$
   (c) salt + carbon dioxide gas + water
4. (a) $Pb(NO_3)_2 + 2KI_{(aq)} \rightarrow PbI_{2(s)} + 2KNO_{3(aq)}$
   (b) $AgNO_{3(aq)} + NaCl_{(aq)} \rightarrow AgCl_{(s)} + NaNO_{3(aq)}$

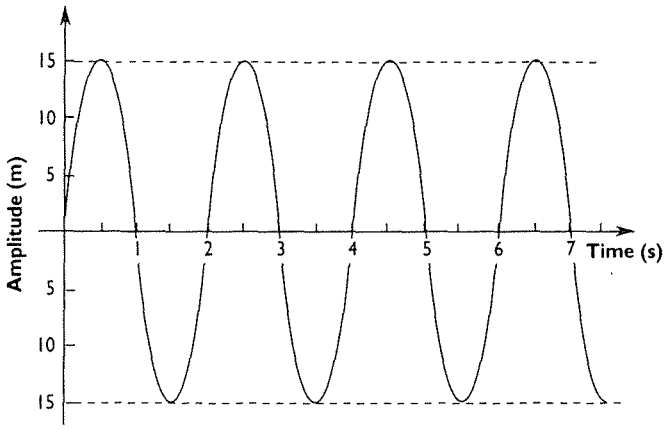
BLM 18: Comprehension: A closer look at the chemistry of limestone caves

1. Acid formed is carbonic acid, which has the symbol $H_2CO_{3(aq)}$.
2. Soluble calcium hydrogen carbonate forms when limestone reacts with carbonic acid.
3. When the solution reaches an area that has a low concentration of carbon dioxide, a precipitate of calcium carbonate may form.
4. (a) Stalactites form if the precipitate forms before the drop falls.
   (b) Stalagmites form if the precipitate forms after the drop hits the cave floor.

BLM 19: Making waves

1. amplitude = 5 m
   wavelength = 4 m
2. amplitude = 2 m
   wavelength = 2 m
3. amplitude = 2m
   frequency = 1/1 = 1 Hz
4. amplitude = 1.5 m
   frequency = 1/0.5 = 2Hz





Frequency = 0.50 Hz

$\therefore$ period = $\frac{1}{0.5}$ = 2 s

BLM 20: Working with waves

1. (a) 2 m (b) 1 m (c) 1/1 = 1 Hz
   (d) $v = 1 \times 1 = 1$ m/s
2. (a) 0.1 m (b) 2/3 m or 0.67 m (c) 1/0.5 = 2 Hz
   (d) $v = 2 \times 2/3 = 4/3 = 1.33$ m/s
3. (a) 1 m (b) 0.025 m (c) 1/0.1 = 10 Hz
   (d) $v = 10 \times 0.025 = 0.25$ m/s
4. (a) 3 m (b) 4.0 m (c) 1/4 = 0.25 Hz
   (d) $v = 0.25 \times 4 = 1$ m/s
5. (a) 0.1 m (b) 0.2 m (c) 1/1 = 1 Hz
   (d) $v = 1 \times 0.2 = 0.2$ m/s

BLM 21: The eye

Refer to Figure 4.49 (a), in student text.
(a) pupil (b) iris (c) cornea (d) lens (e) retina
(f) choroid (g) schlera (h) blind spot (i) optic nerve
(j) vitreous humour
Long-sightedness produces an image *behind* the retina.
Short-sightedness produces an image in *front* of the retina.

BLM 22: The ear

1. Refer to Figure 4.75(a), in student text.
   (a) pinna (b) eardrum (c) hammer
   (d) anvil (e) stirrup (f) semi-circular canals
   (g) auditory nerve (h) cochlea (i) Eustachian tube
   (j) outer ear (k) middle ear (l) inner ear
2. Students may simply refer to their text and write at least 4 sentences using that information. Alternatively, students may base their sentences on the information provided on the BLM.

BLM 24: Reflection

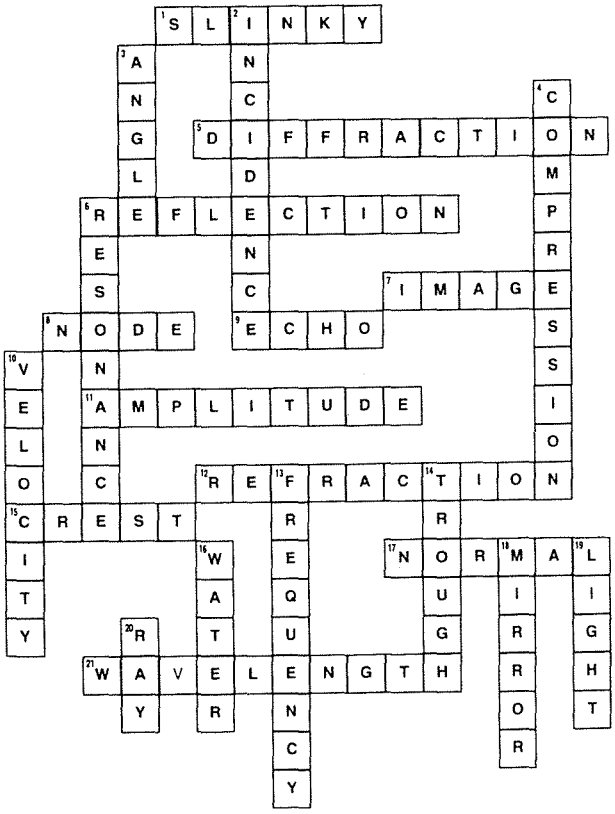
Reflection

1. Refer to Figure 4.13 in student text
2. (a) $r = 20°$ (b) $s = t = 40°$ (c) $u = r = 55°$
   (d) $w = 40°$
3. Series of reflection diagrams:
   mirror (a) planar
   mirror (b) concave
   mirror (c) convex

BLM 26: Someone's listening

1. (a) People can hear some lower frequency bat noises. Upper human range of hearing—up to 20 000 Hz will hear bat noises from 10 000 Hz.
   (b) People can hear some lower frequency porpoise noises. Upper human range of hearing—up to 20 000 Hz will hear porpoise noises from 7000 Hz.
2. The alarm would have to emit frequencies above 20 000 Hz, so as *not* to be heard by humans, but below 150 000 so that porpoises would still be able to hear the sound.
3. Frequencies above 20 000 Hz cannot be heard by people. Dogs can hear up to 50 000 Hz and cats can hear up to 65 000 Hz, so the sound would need to be between 20 000 Hz and 50 000 Hz.
4. (a) (i) highest frequency—bats and porpoises can both emit up to 120 000Hz
   (ii) lowest frequency—person
   (b) (i) highest frequency—porpoise (up to 150 000 Hz)
   (ii) lowest frequency—dog
5. No, because people only emit sounds in the range 85-1120 Hz. The person's hearing covers more than that range.
6. Dogs

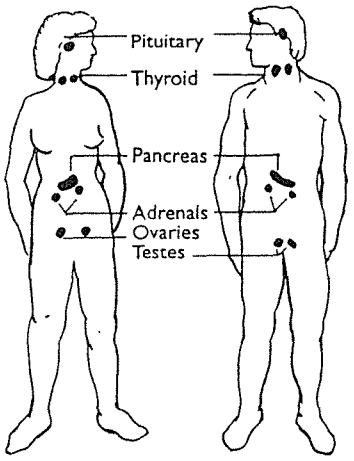
BLM 27B: Traditional crossword: waves



BLM 28: Body chemistry

1. pancreas 2. (a) ovary, testes (b) pituitary (c) pituitary and thyroid (d) adrenal

3.



4. (a) Mental and physical stunting of growth.
   (b) The girl or boy will physically go through puberty at that early age.

5. Parathyroid regulates the metabolism of phosphorus and calcium. The thymus influences production of white blood cells. (It is most active during puberty.)

BLM 32: Unspoken language

This sheet does not have 'correct' answers. Discussion of student answers is the best way to reach consensus.

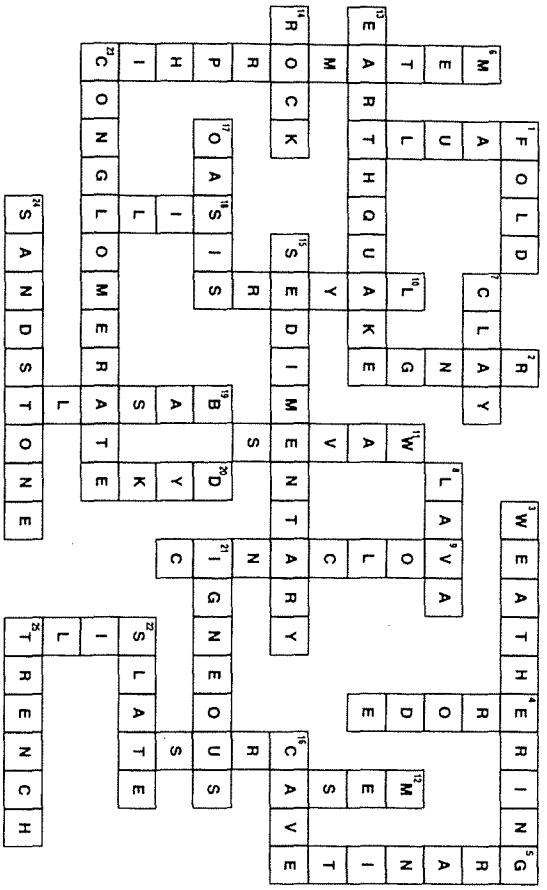
2. Possible answers
   (a) somebody 'telling someone off'
   (b) 'I'm ignoring you'
   (c) victory
   (d) sad
   (e) 'I'm interested'
   (f) 'Come to me.'

BLM 34: A simplified key for identifying some common rocks

1. Sam—granite, Judy—sandstone,
   Louise—conglomerate, Michael—marble,
   Flavia—gneiss, Con—gabbro

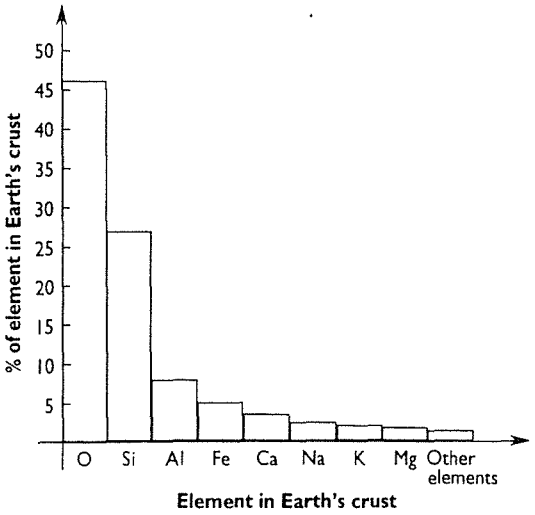
2. Ideas for rock identification from the key include testing the reactivity with dilute acid, observing the colour, the crystalline structure, the type and size of the particles, the sharpness of the edges of the particles, whether the rock is layered and whether the rock will split along those layers. Other tests not in the key include hardness and streak.

BLM 35B: Traditional crossword: The changing Earth

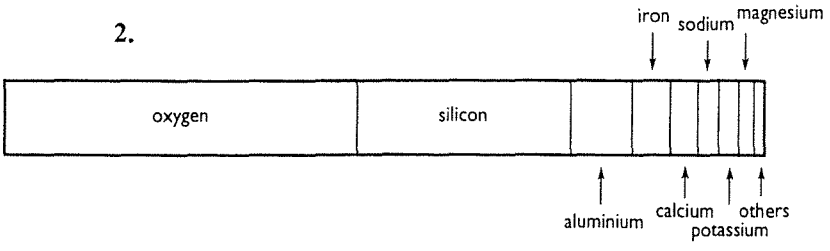


BLM 36: Chemical elements in the Earth's crust

1.



2.



3. 46.6% + 27.7% = 74.3% (almost 3/4)

4. (a) (i) carbon (ii) iron
   (b) eight (c) iron (and its compounds)

BLM 37: Rock layers exercise

Refer to diagrams in student text.

BLM 38: A closer look at earthquake waves

1. A typical table could be:

Name of wave	*Type of wave*	*Wave speed*	*Medium through which it travels*
Primary (P)	compression	between 5.5 and 13.5 km/h	solids and liquids
Secondary (S)	transverse	between 3.2 amd 7 km/h	solids only
Surface (L)	longitudinal	3.2 km/h	over surface only

2. (a) P-primary waves (b)(i) P-waves (ii) L-waves

   Question:
   Distance from the epicentre

Distance (km)	*Difference between the times of arrival of P-waves and S waves*
1000	2 min 20 s
2000	3 min 45 s
3000	4 min 20 s
4000	5 min 45 s
5000	6 min 20 s

(a) S—time of arrival = 6.8 minutes
P—time of arrival = 0
Difference = 6.8 minutes
Distance is approximately 5250 km

(b) S—time of arrival = 7 minutes
P—time of arrival = 4 minutes
Difference = 3 minutes
Distance is approximately 1500 km

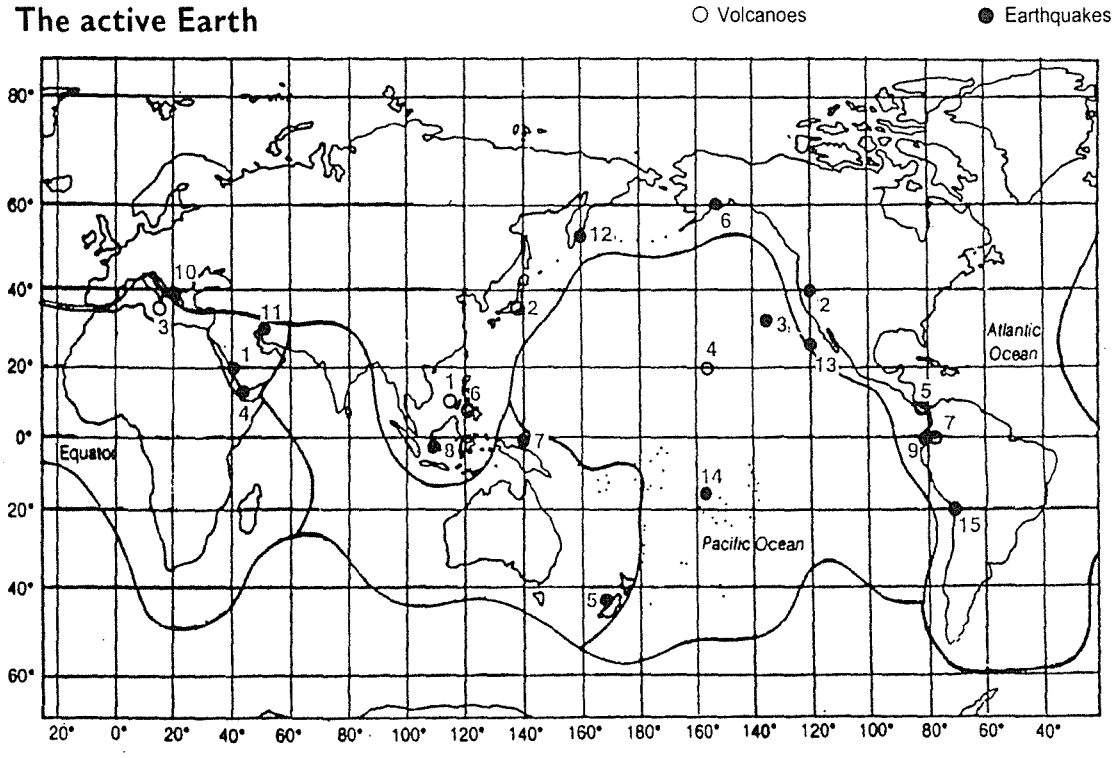
BLM 41: Additional product: Bandaids

No answers provided as this is really an additional product to be studied either as an assignment or as extension work for fast workers.

BLM 42: Warranties and guarantees

1. The hair dryer may be repaired free of charge and without labour costs (or, at Tom Brown's option, it may be replaced or the purchase price may be refunded).
2. Students will have different answers and opinions. The store should probably be reported to the state consumer affairs department.
3. No, accidental damage means that the guarantee is voided.
4. Take it back to a Tom Brown store. They really should fix it. If the store refuses because the warranty has run out, a call to the relevant consumer affairs department may be worthwhile.
5. This statement provides good material for discussion. There is no correct answer. It is a matter of personal choice.

BLM 39: The active Earth

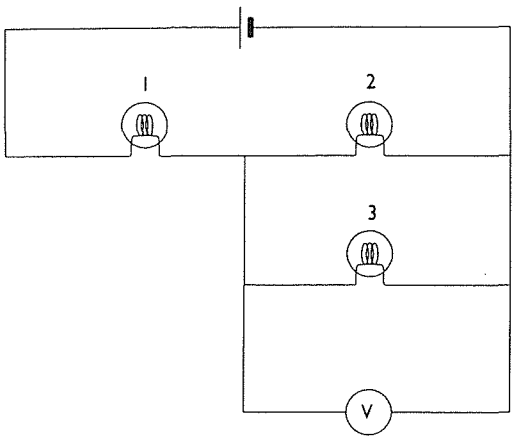


BLM 43: Chapter 1 Topic test: Electricity and magnetism

1. (d) **2.** (b) **3.** (c) **4.** (a) **5.** (b)

6. Imagine that the electroscope had a positive charge. If the object with unknown charge was brought near the electroscope:
- a further divergence of the leaves would mean that the object had a positive charge
- a movement together of the leaves would mean that the object had a negative charge

7.



8. (a) kW.h used = $\frac{200}{1000}$
(b) cost of 200 kW.h = \$30
cost of 1000 kW.h = \$100
(c) total bill = \$130

9. (a) A variety of aims would be acceptable, for example to investigate the magnetic field of a current-carrying wire.
(b) The compass needle should have moved depending on where it was relative to the wire.
(c) The current produces a magnetic effect.

BLM 44: Chapter 2 Topic test: Keeping the balance

1. (d) **2.** (d) **3.** (b) **4.** (c) **5.** (d)

6. (a) Soil contains very little air after compaction.
(b) Plants may die because the ground is too hard. If plants die erosion may occur, with valuable topsoil being removed by wind and water.

7. Three types of adaptations:
Structural, for example folds of skin between the sugar gliders front and back feet allow the animal to glide.

Functional, for example some desert plants only open their stomates at night to cut down water loss.

Behavioural, for example birds carrying out dances to attract a mate.

8. (a) (i) The air quality at Southstone may not be good, as Southstone is downwind from the crop-dusting areas.
(ii) Water quality may not be good if effluent from sewage farm and pesticides factory, and runoff from farmlands is not controlled.
(1 mark each, in as much detail as is approriate for your class)
(b) No, water is downriver from sewage treatment farm.
(c) Fertilisers, possibly in runoff from farming land, may have caused eutrophication of the river. (Also, the sewage farm may have added to the problem.)

9. (a) (i) Ozone layer was thinnest in February.
(ii) Ozone layer was thickest in August.
(b) CFCs or chlorofluorocarbons
(c) CFCs are being replaced by chemicals that are believed to be ozone-friendly. (International treaties have also been signed limiting the use of CFCs.)
(d) Increase in skin cancer. Phytoplankton in the food chain may die, causing disastrous effects.

BLM 45: Chapter 3 Topic test: Changes and matter

1. (d) **2.** (a) **3.** (b) **4.** (d) **5.** (c)

6. (a) cobalt nitrate + silver chloride
(b) sodium sulfate + copper carbonate
(c) barium chloride + magnesium nitrate

7. (a) hydrochloric (b) nitric

8. Uses of radioisotopes include diagnosis of diseases, treatment of cancers, and forensic work.

9. (a) aqueous magnesium hydroxide + hydrochloric acid → aqueous magnesium chloride + water
(b) $Mg(OH)_{2(aq)} + 2HCl_{(aq)} \rightarrow MgCl_{2(aq)} + 2H_2O_{(l)}$

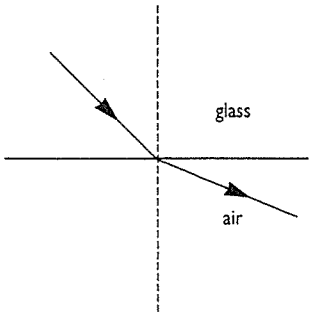
10. (a) (i) Uranium 238 has a very long half-life.
(ii) Short-lived isotopes decay so quickly that the time spent transporting them may mean that they are no longer useful. Short-lived isotopes must be produced close to where they will be used.
(b) (i) Food lasts longer, without refrigeration.
(ii) Possible residual radiation in foods.

BLM 46: Chapter 4 Topic test: Waves

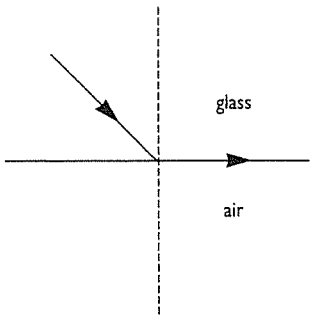
1. (a) **2.** (b) **3.** (d) **4.** (c) **5.** (b)

6. (a) labelling exercise—see text
(b) (i) The pinna collects and channels sound into the auditory canal.
(ii) The cochlea is part of the inner ear that is filled with fluid. The moving fluid causes movement in tiny hairs in the cochlea, which send signals to the brain.
(iii) The eardrum vibrates when sound waves in air push on it. The drum in turn affects the small bones of the middle ear.

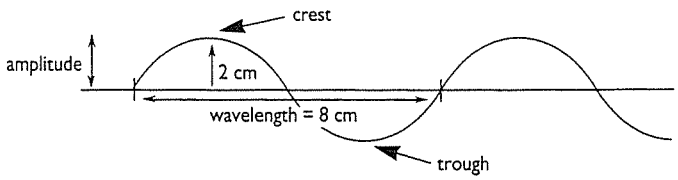
7. (a)



(b)

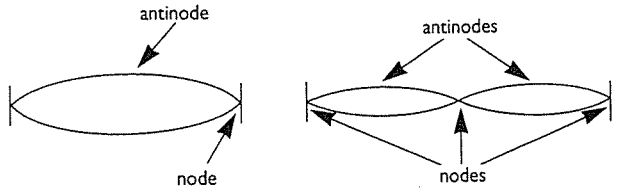


8. (a)



(b) (i) If the amplitude was doubled the sound would be louder.
(ii) If the wavelength was halved, then the frequency would be doubled, so the sound would have a higher pitch.

9. (a) and (b)



Note: Any standing waves in strings are acceptable.
(c) an air column
(d) quality (or shape of the waveform) of the note is different
(e) resonance

BLM 47: Chapter 5 Topic test: Responding and communicating

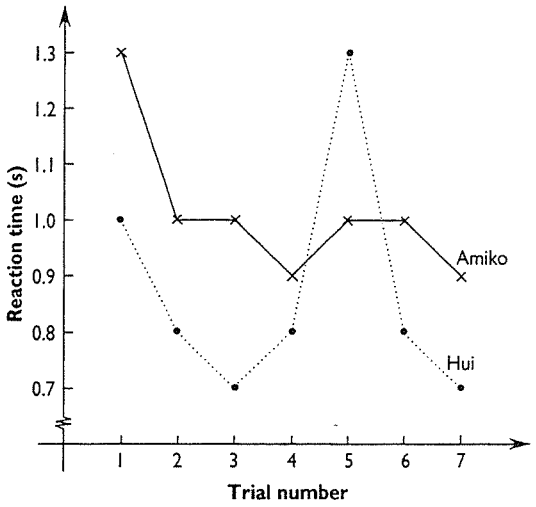
1. (d) **2.** (c) **3.** (a) **4.** (c) **5.** (d)

6. Example of a stimulus: Dog sees the food
Example of response: Dog goes toward the food
Example of a stimulus: Cat sees the dog
Example of response: Cat arches its back
Note: The cat arching its back provides a stimulus for the dog. The dog then responds by moving away.

7. written language

8. taste, tongue, taste buds; smell, nose, olfactory nerves

9. (a) Graph—1 mark for axes, 1 mark for each set of data correctly plotted.



Note: Histograms shaded differently for Hui and Amiko are acceptable.
(b) The experimental results for each person vary a little. Hui's 5th attempt should probably be ignored.
(c) Overall, Hui's reaction time was faster than Amiko's.

10. (a) plants
(b) One auxin stimulates the tip of the plant away from the light to grow more, so that the plant grows toward the light.
(c) hormones (d) Example in text was adrenalin. It increases muscle reaction and heart beat.

BLM 48: Chapter 6 Topic test: Changes in the Earth's crust

1. (d) **2.** (d) **3.** (a) **4.** (b) **5.** (c)

6. Mercalli's scale relied on observations of damage while Richter's scale relies on measurements of earthquake waves. (Damage often appeared worse in built-up areas, making comparisons on Mercalli's scale unreliable.)

7. Desert landforms include mesas, buttes, alluvial fans and playa lakes. More information is found in the text.

8. The anticline has a layer of:
- coal at its base, indicating swamp areas, long ago
- conglomerate next, indicating the presence of a fast flowing river, long ago
- shale as its uppermost layer, indicating an area of shallow, quiet waters in the past

These once flat layers have been compressed inwards to form an anticline. The area has then been flooded by the sea. Deposits of limestone, indicating warm coral

seas, has then been deposited on top of the anticline. This layer has then been worn away by weathering and erosion.

Note: There have been also changes in the water level, over time.

(Marks could be given for

- naming the order of the layers—1 mark
- saying history that rock types indicate—2½ marks
- word anticline and its cause—2 marks
- weathering and erosion—½ mark

9. Two methods only were requested.
The farmer should:

- ensure that areas are not overgrazed, by keeping sheep numbers down in a particular area
- plant wind breaks, which will slow the wind through the area and the roots of trees will hold soil together
- use methods of strip and contour farming so that runoff carrying valuable topsoil can be avoided

BLM 49: Chapter 7 Topic test: Consumer science

1. (b) **2.** (d) **3.** (b) **4.** (a) **5.** (b)

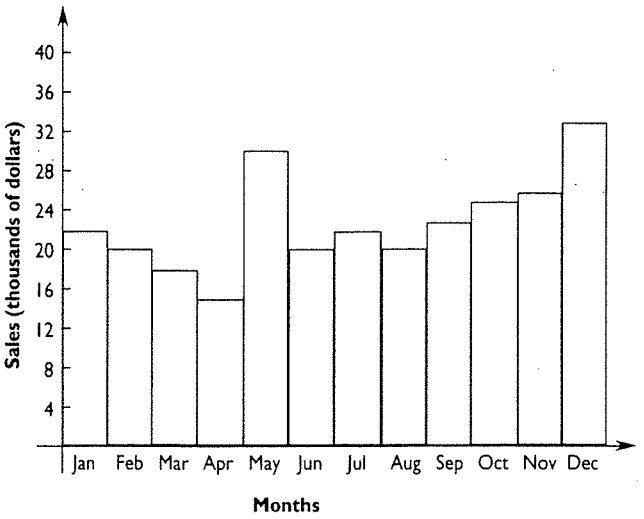
6. (a)
- unsuitable for babies under 6 months
- must be used under adult supervision

(b) A matter of choice.

- The toy may be good fun, if used correctly.
- The toy may cause problems if the plug keeping the water inside becomes loose:
  —the plug may be able to be swallowed;
  —water could escape.
- The toy may also burst depending on the durability of the plastic.

7. People likely to be at risk of going grey would be older people or people with a family history of turning grey at a young age. Meaningless conclusions may be reached if the product was tested on a group that were unlikely to have their hair turn grey.

8. (a) Histogram



(b) December

(c) May, because the sales before May reached their lowest for the year. (Some students choose December. This may provide a good discussion topic related to sales.)

9. (a) To check which substance had the better holding power.

(b) Substances (*X* and *Y*) and the wall types.
(Length of the tape may be included.)

(c) Length of the tape.

(d) Ingrid would need to test the substances on identical wall surfaces.

(e) Her conclusion was not valid because different wall surfaces had been used.

BLM 50: Practical exam